UNCLASSIFIED

AD NUMBER

AD864331

NEW LIMITATION CHANGE

TO

Approved for public release, distribution unlimited

FROM

Distribution authorized to DoD only; Administrative/Operational Use; Sep 1969. Other requests shall be referred to SAMSO/SMSD, Los Angeles Air Force Station, CA 90045.

AUTHORITY

Space and Missile Sys Org., USAF ltr dtd 1 Sep 1971

THIS PAGE IS UNCLASSIFIED

7

AD864331

AD 864331L

SAMSO TR 69-383

AN EXPERIMENTAL INVESTIGATION OF BOUNDARY LAYER TRANSITION ON A CONE AT ANGLE OF ATTACK

Prepared for
Space and Missile System Organization
Norton Air Force Base, California

EACH TRANSMITTAL OF THIS DOCUMENT
OUTSIDE THE DEPARTMENT OF DEFENSE
MUST HAVE PRIOR APPROVAL OF SAMSO
[redacted]
SAMSO/SMSD
L.A. AFS CALIF 90045

The distribution of this report is limited because it contains technology requiring disclosure only within the Department of Defense.

D D C
FEB 2 1970
C

SAMSO TR 69-383

AN EXPERIMENTAL INVESTIGATION OF BOUNDARY LAYER TRANSITION ON A CONE AT ANGLE OF ATTACK

BY

A. Martellucci
R. S. Neff
W. H. True III

SEPTEMBER 1969

**EACH TRANSMITTAL OF THIS DOCUMENT
OUTSIDE THE DEPARTMENT OF DEFENSE
MUST HAVE PRIOR APPROVAL OF SAMSO
[redacted]**

The distribution of this report is limited because it contains technology requiring disclosure only within the Department of Defense.

FOREWORD

This report presents the results of work performed by the General Electric Re-entry and Environmental Systems Division during the second half of CY 1969 under Contract F04701-69-C-0116 which is jointly supported by SAMSO and ARPA. The work was accomplished under Task 7.8.2 (Asymmetric Transition Effects on Vehicle Trim) of the STREET G Program and was monitored by Lt. R. Padfield (U.S. Air Force, SAMSO) and K. Kresa (ARPA).

This report has been reviewed and is approved.

R. Padfield, Lt., USAF
Space and Missile System
Organization (SMYSE)
Air Force Systems Command
Norton Air Force Base
California

ABSTRACT

As the first part of the Strategic Re-entry Technology (STREET G) task to determine the effect of asymmetric transition on static stability, an experimental investigation of the influence of angle of attack on boundary layer transition front location and shape has been conducted at AEDC Tunnel B at Mach 8. The model was a stainless steel 7.2 degree half-angle cone with three bluntness ratios (R_N/R_B = 0.0.01, 0.02). For each of the bluntness ratios, heat transfer data were obtained for four values of the free stream Reynolds number and for four angles of attack, that is, $\alpha = 0$ degree, 1 degree, 2 degree, and 4 degree. Comparisons of the measured heat transfer at $\alpha = 0$ degree were made with theory and good agreement resulted.

CONTENTS

Section Page

FOREWORD ii

ABSTRACT iii

NOMENCLATURE ix

I INTRODUCTION 1

II MODEL DESCRIPTION AND TEST PROCEDURES . . . 2

III TEST FACILITY DESCRIPTION 5

IV DATA REDUCTION 6

V RESULTS 7

Data Comparisons with Theory 7
Transition Region Definition 9

VI CONCLUSIONS 13

VII RECOMMENDATIONS 14

REFERENCES 15

APPENDIX A. GENERAL HEAT TRANSFER PROGRAM, TUNNELS A, B AND C, VON KARMAN FACILITY, AEDC 16

ILLUSTRATIONS

Figure		Page
1	Model Used in Heat Transfer Test	24
2	Stanton Number vs. Time for Selected X/L Locations, X/L = .3363	25
3	Stanton Number vs. Time for Selected X/L Locations, X/L = .6722	26
4	Stanton Number vs. Time for Selected X/L Locations, X/L = .8822	27
5	Stanton Number vs. Time for Selected X/L Locations, X/L = .9648	28
6	GE Asymmetric Trim Test Heat Transfer Phase, Group 1	29
7	GE Asymmetric Trim Test Heat Transfer Phase, Group 2	30
8	GE Asymmetric Trim Test Heat Transfer Phase, Group 3	31
9	GE Asymmetric Trim Test Heat Transfer Phase, Group 4	32
10	GE Asymmetric Trim Test Heat Transfer Phase, Group 5	33
11	GE Asymmetric Trim Test Heat Transfer Phase, Group 11	34
12	GE Asymmetric Trim Test Heat Transfer Phase, Group 12	35
13	GE Asymmetric Trim Test Heat Transfer Phase, Group 13	36
14	GE Asymmetric Trim Test Heat Transfer Phase, Group 14	37
15	GE Asymmetric Trim Test Heat Transfer Phase, Group 15	38
16	GE Asymmetric Trim Test Heat Transfer Phase, Group 16	39
17	GE Asymmetric Trim Test Heat Transfer Phase, Group 22	40
18	GE Asymmetric Trim Test Heat Transfer Phase, Group 23	41
19	GE Asymmetric Trim Test Heat Transfer Phase, Group 24	42

ILLUSTRATIONS (Cont'd)

Figure		Page
20	GE Asymmetric Trim Test Heat Transfer Phase, Group 25	43
21	GE Asymmetric Trim Test Heat Transfer Phase, Group 26	44
22	GE Asymmetric Trim Test Heat Transfer Phase, Group 52	45
23	GE Asymmetric Trim Test Heat Transfer Phase, Group 32	46
24	GE Asymmetric Trim Test Heat Transfer Phase, Group 33	47
25	GE Asymmetric Trim Test Heat Transfer Phase, Group 34	48
26	GE Asymmetric Trim Test Heat Transfer Phase, Group 35	49
27	GE Asymmetric Trim Test Heat Transfer Phase, Group 36	50
28	GE Asymmetric Trim Test Heat Transfer Phase, Group 47	51
29	GE Asymmetric Trim Test Heat Transfer Phase, Group 48	52
30	GE Asymmetric Trim Test Heat Transfer Phase, Group 49	53
31	GE Asymmetric Trim Test Heat Transfer Phase, Group 50	54
32	GE Asymmetric Trim Test Heat Transfer Phase, Group 51	55
33	GE Asymmetric Trim Test Heat Transfer Phase, Group 42	56
34	GE Asymmetric Trim Test Heat Transfer Phase, Group 43	57
35	GE Asymmetric Trim Test Heat Transfer Phase, Group 44	58
36	GE Asymmetric Trim Test Heat Transfer Phase, Group 45	59
37	GE Asymmetric Trim Test Heat Transfer Phase, Group 48	60
38	GE Asymmetric Trim Test Heat Transfer Phase, Group 6	61
39	GE Asymmetric Trim Test Heat Transfer Phase, Group 7	62

ILLUSTRATIONS (Cont'd)

Figure Page

40 GE Asymmetric Trim Test Heat Transfer Phase, Group 8 63
41 GE Asymmetric Trim Test Heat Transfer Phase, Group 9 64
42 GE Asymmetric Trim Test Heat Transfer Phase, Group 10 65
43 GE Asymmetric Trim Test Heat Transfer Phase, Group 17 66
44 GE Asymmetric Trim Test Heat Transfer Phase, Group 18 67
45 GE Asymmetric Trim Test Heat Transfer Phase, Group 19 68
46 GE Asymmetric Trim Test Heat Transfer Phase, Group 20 69
47 GE Asymmetric Trim Test Heat Transfer Phase, Group 21 70
48 GE Asymmetric Trim Test Heat Transfer Phase, Group 27 71
49 GE Asymmetric Trim Test Heat Transfer Phase, Group 28 72
50 GE Asymmetric Trim Test Heat Transfer Phase, Group 29 73
51 GE Asymmetric Trim Test Heat Transfer Phase, Group 30 74
52 GE Asymmetric Trim Test Heat Transfer Phase, Group 31 75
53 GE Asymmetric Trim Test Heat Transfer Phase, Group 37 76
54 GE Asymmetric Trim Test Heat Transfer Phase, Group 38 77
55 GE Asymmetric Trim Test Heat Transfer Phase, Group 39 78
56 GE Asymmetric Trim Test Heat Transfer Phase, Group 40 79
57 GE Asymmetric Trim Test Heat Transfer Phase, Group 41 80
58 Stanton Number Distribution for a 7.2° Cone at Mach 8, $Re_\infty = 3.79 \times 10^6$ per foot, $R_N/R_B = 0$ 81

ILLUSTRATIONS (Cont'd)

Figure Page

59 Stanton Number Distribution for a 7.2° Cone at Mach 8, $Re_\infty = 2.18 \times 10^6$ per foot, $R_N/R_B = 0$ 82

60 Stanton Number Distribution for a 7.2° Cone at Mach 8, $Re_\infty = 1.35 \times 10^6$ per foot, $R_N/R_B = 0.01$ 83

61 Stanton Number Distribution for a 7.2° Cone at Mach 8, $Re_\infty = 3.79 \times 10^6$ per foot, $R_N/R_B = 0.02$ 84

62 Stanton Number Distribution for a 7.2° Cone at Mach 8, $Re_\infty = 2.20 \times 10^6$ per foot, $R_N/R_B = 0.02$ 85

63 Effect of Reynolds Number and Bluntness on the Transition Region 86

64 End of Transition Location on a Cone at Angle of Attack, $M_\infty = 8$, $\theta_c = 7.2^\circ$, $R_N/R_B = 0$ 87

65 End of Transition Location on a Cone at Angle of Attack, $M_\infty = 8$, $\theta_c = 7.2^\circ$, $R_N/R_B = 0.01$ 88

66 End of Transition Location on a Cone at Angle of Attack, $M_\infty = 8$, $\theta_c = 7.2^\circ$, $R_N/R_B = 0.02$ 89

67 Spatial Distribution of End of Transition with Reynolds Number and Angle of Attack, $M_\infty = 8$, $R_N/R_B = 0$, $\theta_c = 7.2^\circ$ 90

68 Spatial Distribution of End of Transition with Reynolds Number and Angle of Attack, $M_\infty = 8$, $R_N/R_B = 0.01$, $\theta_c = 7.2^\circ$ 91

69 Spatial Distribution of End of Transition with Reynolds Number and Angle of Attack, $M_\infty = 8$, $R_N/R_B = 0.02$, $\theta_c = 7.2^\circ$ 92

70 Effect of Asymmetric Transition on Pitching Moment Coefficient 93

71 Proposed End of Transition Front Locations for Force Tests, $R_N/R_B = 0$ 94

NOMENCLATURE

SYMBOLS	DEFINITION
A_B	Model base area, in.^{2}
C_m	Pitching moment coefficient based on diameter
C_p	Specific heat BTU/lb^{o}F
d_B	Model base diameter (11.00 in.)
h	Enthalpy
k	Thermal conductivity
L	Model length, in.
M	Mach number
P	Pressure, psia
Pr	Prandtl Number, $C_p\mu/k$
q	Dynamic pressure, psia
q	Heat transfer flux, BTU/ft^2 sec.
r_o	Local model outer radius
R	Universal gas constant, 1545. 43 ft. $lb._f/^o$ R lb_m mole
R_e	Reynolds number
R_N/R_B	Model nose bluntness ratio
S_T	Stanton number, $\dot{q}/(h_o - h_w)(\rho u)_\infty$
s	Model wetted length
T	Temperature
t	Time, seconds
u	Velocity component parallel to flow direction, fps.
X	Model axial distance, in.

Greek Symbols

α	angle of attack, degrees
γ	ratio of specific heats
μ	absolute viscosity
ρ	density, lb_m/ft^3
τ	model wall thickness (inches)

Subscripts

e	edge conditions
o	stagnation conditions
w	wall conditions
∞	free stream conditions

Superscripts

*	reference conditions

SECTION I

INTRODUCTION

As part of the Strategic Re-entry Technology Program (STREET G), experimental studies are being conducted to investigate the effects that asymmetric transition can have on the static stability and resulting trim angle of attack of an ablating re-entry vehicle. The experimental investigation is composed of two phases: the first, to map the transition front location and shape on a no-blowing conical model at angle of attack; the second, to measure the forces and moments on a porous model configured to simulate ablation in the asymmetric turbulent region determined in the first phase. From this test series, the objective is to establish whether the trim angles of attack that are observed in flight, beginning at the point of transition onset at the base, can be attributed to the effets of asymmetric transition progression along the body. The investigation will not duplicate the many phenomena that occur in flight but does represent a reasonable facsimile of the flow processes.

This report presents the experimental data obtained on the first phase, i.e., transition mapping on an impervious conical model, of the test program. The tests were conducted at Mach 8 in Tunnel B of the van Karman Facility at AEDC. Thermocouples have been utilized to establish the shape and location of the transition front as a function of angle of attack, Reynolds number, and nose bluntness.

SECTION II

MODEL DESCRIPTION AND TEST PROCEDURE

The model used in the heat transfer test was a 7.2 degree half-angle cone, 43.54 inches long, with a removable nose section, Figure 1. Three nose bluntness ratios were utilized for the model (i.e., R_N/R_B = 0, 0.01, 0.02). One hundred thermocouples were installed on the inside of the model wall. The concentration of thermocouples was on one-half the model with several installed on the opposite half to check the yaw symmetry of the heat transfer. Table I details the location and wall thickness at each thermocouple.

Data were obtained at Mach 8 for four (4) Reynolds numbers with the model pitched at angles of attack of 0 degree, 1 degree, 2 degree, 4 degree. A summary of the test conditions is presented in Table II. The four Reynolds numbers were chosen to place the end of the transition region at prescribed axial locations on the model at zero angle of attack. The desired end of transition locations were to span the model, from near the aft end to a point as far forward as possible. The sharp cone (R_N/R_B = 0) and R_N/R_B = 0.02 configurations were tested at each of the four Reynolds numbers while the 1 percent bluntness model was tested at the two lowest Reynolds numbers only.

The model was mounted on the tunnel injection mechanism and at each test condition was inserted into the tunnel at the desired angle of attack. Data were recorded on magnetic tape at a rate of two hundred samples per second per thermocouple. The model was withdrawn from the tunnel and cooled in the dump tank after obtaining data for each test condition.

TABLE 1. LOCATION AND WALL THICKNESS AT 100 THERMOCOUPLES

"X" Dim.	T/C No. on Each Ray and Wall Thk. in Inches															
	0° Ray	Wall Thk.	45° Ray	Wall Thk.	90° Ray	Wall Thk.	135° Ray	Wall Thk.	180° Ray	Wall Thk.	225° Ray	Wall Thk.	270° Ray	Wall Thk.	315° Ray	Wall Thk.
6.560	1	.049														
8.130	2	.0495														
10.988	3	.059	21	.059	39	.059	57	.059	75	.058						
12.841	4	.063	22	.064	40	.064	58	.064	76	.064						
14.694	5	.063	23	.060	41	.063	59	.063	77	.059						
16.547	6	.060	24	.060	42	.063	60	.062	78	.060						
18.400	7	.058	25	.058	43	.059	61	.060	79	.059						
20.253	8	.055	26	.056	44	.062	62	.058	80	.057						
22.106	9	.054	27	.053	45	.055	63	.051	81	.050						
23.959	10	.056	28	.054	46	.057	64	.053	82	.053						
25.812	11	.055	29	.055	47	.056	65	.053	83	.053						
27.665	12	.054	30	.054	48	.055	66	.053	84	.053						
29.518	13	.050	31	.049	49	.050	67	.048	85	.048						
31.523	14	.048	32	.047	50	.047	68	.047	86	.047			95	.045		
33.306	15	.048	33	.055	51	.052	69	.056	87	.048						
35.089	16	.056	34	.056	52	.052	70	.058	88	.052			96	.053		
36.872	17	.051	35	.054	53	.050	71	.055	89	.051						
38.655	18	.050	36	.0525	54	.049	72	.054	90	.046	93	.051	97	.051	99	.052
40.438	19	.050	37	.051	55	.048	73	.049	91	.049						
42.221	20	.048	38	.048	56	.048	74	.048	92	.046	94	.048	98	.048	100	.048

TABLE II. SUMMARY OF TEST CONDITIONS

$M_\infty = 8$

$R_{e_\infty} \times 10^{-6}$/ft	P_o PSIA	T_o (^oR)	R_N/R_B	a (Degrees)
3.79	860	1332.0	0, 0.02	0, 1, 2, 4
3.02	670	1310.0	0, 0.02	0, 1, 2, 4
2.20	470	1300.0	0, 0.01, 0.02	0, 1, 2, 4
1.32	280	1260.0	0, 0.01, 0.02	0, 1, 2, 4

SECTION III

TEST FACILITY DESCRIPTION

AEDC's hypersonic wind tunnel B is equipped with an axisymmetric contoured nozzle which provides Mach 6 and 8 flow through the 50-inch diameter test section. The tunnel is closed circuit which operates over a range of pressures with air supplied by a main compressor system. Stagnation temperatures sufficient to avoid liquefaction in the test section are obtained through the use of a natural-gas-fired combustion heater. The tunnel is equipped with a model injection system which facilitates model changes or cooling without requiring the tunnel to shut down.

Reynolds number variations from 0.30 to 3.8 x 10^6 per foot correspond to dynamic pressure variations from 0.30 to 4.1 psi for a Mach number of 8.0. The stagnation temperature in the tunnel is approximately 900 degrees F. The model may be rolled 180 degrees and pitched a total of 30 degrees on a straight sting arrangement.

A more detailed description of the facility can be found in Reference 1.

SECTION IV

DATA REDUCTION

Data were recorded from the model sensors during the entire tunnel entry time period. That is, the temperature versus time history of each thermocouple was recorded at the rate of 200 samples per second. An initial time, t_o was established when the model reached the tunnel centerline. Injection of the model from the dump tank below the tunnel to the centerline takes approximately 2 seconds. The data printout is based on this time as being zero. Since the aerodynamic heat transfer to the model is proportional to the slope of the temperature-time history at a prescribed time, a least square curve was fit to the ± 10 points in the vicinity of this time. The slope was then obtained from the curve fit. The data were calculated at four time intervals, 0.00, 0.25, 0.50, and 1.00 seconds from time zero. The graphical and tabulated data presented in this report are the t = 0 data. A complete listing of all the available data may be obtained from the authors. The equations and curve fits employed at AEDC in reducing the Tunnel B and C thermocouple data may be found in Appendix A.

Some typical variations of the Stanton number (~ heat transfer) with time for several thermocouples at three axial stations may be found in Figures 2 through 5. The relative accuracy of the heat transfer as calculated by the one-dimensional heat conduction equation

$$\dot{q} = \rho C_p \tau \frac{dT}{dt}$$

which assumes that there is no conduction within the model and that there is no convection, is approximately ~ 6 percent. Roughly ± 1 percent can be attributed to the uncertainty in the specific heat of the material. The error bars shown in Figures 2-5 were drawn consistent with the aforementioned accuracy. Since the accuracy of the one-dimensional heat conduction equation degrades as the model wall is heated, due to conduction errors, the most accurate data are obtained as soon as the model responds to the sensible aerodynamic heating. For the model wall thickness of 50 to 60 mils, the most accurate time interval is during the first second from time zero. It can be noted from Figures 2-5 that the time dependency of the Stanton number is generally within the accuracy of the heat transfer measurement and consequently, only the data at time zero were plotted. The stated accuracy of the data refers to "good" thermocouple installations. There were several thermocouples on the model that were damaged prior to and during the test. These gages will show up in the axial plots as the spurious points which obviously do not agree with the data trends. No attempt was made to screen out these points.

The Stanton number variation with axial length is plotted in Figures 6 through 57. The corresponding tabulated data are listed before each figure. The data are grouped by model bluntness ratio (R_N/R_B = 0, 0.01, and 0.02) and within each bluntness set are grouped with the Reynolds number in a decreasing order.

SECTION V

RESULTS

The heat transfer distribution on the cone model was obtained along several conical rays, as was noted earlier. The data were obtained at Mach 8 for four values of the free stream Reynolds number. For each Reynolds number, data were obtained at four angles of attack, namely 0 degree, 1 degree, 2 degree, and 4 degree. A limited investigation on the effects of nose bluntness on the transition front location and shape with angle of attack was also obtained.

DATA COMPARISONS WITH THEORY

Comparisons of the data obtained at zero angle of attack were made with the results of the Viscous Interaction Zero Angle of Attack Drag (VIZAAD) Program.(2) For laminar flow, the heat transfer is calculated from Lee's laminar flow equation(3) modified by reference enthalpy conditions to account for the variation of flow properties across the boundary layer:

$$\dot{q}_{LAM} = \frac{0.354\ \rho^* \mu^*\ u_e\ r_o (h_r - h_w)}{(Pr)^{2/3} \left[\int_o^s \rho^* \mu^* u_e r_o^2 ds \right]^{1/2}}$$

For turbulent flow, Walker(4) obtained a solution for the combined momentum and energy integral equations. This solution provides the following relation for the local turbulent heat transfer in terms of boundary layer outer edge properties and reference enthalpy conditions:

$$\dot{q}_{TURB} = \frac{0.0296\ \rho_e^{0.2}\ \mu_e^{0.05}\ (\mu^*)^{0.2}\ (\rho^*)^{0.8}\ u_e\ r_o^{0.25}\ (h_r - h_w)}{\left[\int_o^s \rho_e \mu_e\ \mu_e^{0.25}\ r_o^{1.25}\ ds \right]^{0.2}}$$

In general, solutions were obtained wherein the state of the boundary layer was either all laminar or all turbulent. The data comparisons with theory in terms of the Stanton number, $S_T = \dot{q}/(\rho u_\infty (h_o - h_w)$, for the sharp cone model are presented in Figures 58 and 59; for $R_N/R_B = 0.01$ in Figure 60; for $R_N/R_B = 0.02$ in Figures 61 and 62. From these figures, it can be noted that there is excellent agreement between the data and the theory in the laminar region. The data exhibits an increase through the transitional flow region to a peak which is higher than the "all turbulent" theory. The heat transfer then decays at a rate somewhat faster than the "all turbulent" theory. At sufficiently large distances from the end of transition, the theory and data are in good agreement. In summary, it can be stated that for a non-ablating body, the heat transfer predicted by the VIZAAD program is in good agreement with data for laminar flows and for turbulent flows in the region far removed from the end of transition.

A summary of the deduced transition onset and end points for $\alpha = 0$ degree is tabulated in Table III. Also listed in this table are the local wetted length Reynolds number $R_{e_{ST}}$, the local momentum thickness Reynolds number, Re_{θ_T}, and the edge Mach number at the beginning and end of transition obtained from the laminar VIZAAD theory. The data are plotted in Figure 63. As R_{e_∞} is reduced, the transitional flow region enlarges for both $R_N/R_B = 0$ and 0.02. A summary of the deduced end of transition points on the cone for $R_N = 0$ may be found in Table IV, for $R_N/R_B = 0.01$ in Table V, and for $R_N/R_B = 0.02$ in Table VI. Graphical representations of the data for $\phi = 0$ degree (leeward ray), $\phi = 90$ degree, and $\phi = 180$ degree (windward ray) may be found in Figures 64, 65, and 66 for R_B = 0, 0.01, and 0.02, respectively. The spatial distribution of the end of transition for each of the bluntness ratios investigated may be found in Figures 67-69.

For the sharp cone, the end of transition at angle of attack tends to move slightly rearward from the zero alpha location on the windward ray, and forward on the leeward ray. In particular, the forward movement on the leeward ray is more pronounced than is the aft movement on the wind side (Figure 67). This trend is similar to the sharp cone phenomena experienced by other experimenters(5-9). It should be pointed out that this trend implies that transition occurs at a significantly lower local Reynolds number on the lee side than the windward rays. This forward movement on the lee side has classically been attributed to the destabilizing influences of cross flow.

As the cone is blunted to a value of $R_N/R_B = 0.01$ (R_N = 0.055"), the transition point moves forward on both the windward and leeward rays, from the zero alpha point (Figure 68). However, the forward movement is greater on the lee side than on the windward side. This trend with bluntness is identical to that noted by Stetson and Rushton(7) for bluntness ratios of $R_N/R_B = 0.04$ and 0.08 (R_N = 1/8" and 1/4"). Furthermore, this lee side forward - wind side aft was noted in flight for blunt vehicles. On the lateral side ($\phi = 90$ degrees), the transition location is slightly aft of the zero angle of attack value.

In addition to the data obtained at a one percent bluntness ratio, data were also obtained for $R_N/R_B = 0.02$ (Figure 69). For this bluntness ratio, a reversal occurs. Namely, the transition point moves further forward on the windward ray than on the leeward ray. In addition, the end of transition was noted to be furthest aft on the $\phi = 45$ degree ray. To the author's knowledge, the data reported by Maddalon and Henderson(10) are the only other source of data that indicate a similar phenomena. It should be pointed out that the data attributed to this source by many authors does not actually appear in this reference (i.e., Reference 10) but may be found in the paper by Bertram and Beckwith(11). These data are for a sharp 2.87 degree half angle at a 2 degree angle of attack cone at M = 20 in helium. The definition of transition was obtained with a pitot tube recording impact pressures near the model surface. It is not clear at this time why this apparent reversal occurs.

The prediction of the heat transfer in the transitional and the ensuing turbulent flow regions is out of scope for the current effort and should be the subject of future study. However, the one case ($R_e = 3.79 \times 10^6$ per foot and $R_N/R_B = 0.02$), comparisons were made using the VIZAAD theory for mixed laminar-turbulent solutions. That is, for a prescribed "transition" point, the momentum thickness from the laminar solution, θ_L. is set equal to the turbulent momentum thickness, θ_T. Then, using the turbulent flow relations, the remaining viscous properties δ^*, δ C_f $\dot{q}$, etc. are computed. The implication here is that the turbulent solution has an "effective" origin consistent with θ_T. Two such solutions were made for $(X_T/_L) = 0.5$ (transition onset) and for $X_T/_L = 0.72$ (end of transition). The results are shown in Figure 61. The magnitude of the "heat transfer overshoot" is accurately predicted by this simple approach. Furthermore, the two solutions tend to bracket the experimentally measured heat transfer values in the turbulent flow region.

TRANSITION REGION DEFINITION

As stated earlier, the objective of the first test phase was to establish, quantitatively, the shape of the transition front as dedued from the surface heat transfer measurements. This was performed for several values of the free stream Reynolds number, angle of attack, and the nose bluntness. Based on these results, the second phase of testing (i.e., the force phase) will employ a porous model with the blowing schedule tailored to conform to the transition front shape. That is, the surface mass transfer will be zero in the laminar-transitional region and will be non-zero in the turbulent region. The blowing rate will be varied during the test so as to encompass vehicles with refractory heat shields as well as vehicles with teflon heat shields. The forces and moments that are attributed to the asymmetric transition front will therefore be determined experimentally. Although in an actual flight case the blowing (i.e., ablation) schedule is non-zero everywhere, the aforementioned configuration was deemed a reasonable facsimile of flight.

The physical locations of the transition onset and end points were deduced from the data in the following manner:

The onset point was established to be the point where the heat transfer (i.e., the Stanton number) is a minimum (e.g., see Figures 58 - 62). The end of transition was deduced to be the point where the heat transfer is a maximum. There is some question as to exactly where the end of transition actually occurs because the peak heat transfer overshoots the "all turbulent" theory. For this investigation, however, the maximum heat transfer point was chosen consistently. Since the blowing schedule will be tailored to the end of transition points, emphasis was placed on this data.

As is evident in the data plots of Section IV, the exact location where transition begins or ends is not always clear. Consequently, from the first estimates deduced from the data, a smoothing process was employed wherein the transition points were cross plotted with the angle of attack, α meridian angle, ϕ, free stream unit Reynolds number, R_{e_∞}/ft., and nose bluntness R_N. The faired values resulting from this smoothing process were then rechecked against the heat transfer data. In all cases the resultant transition points actually reflect, to within the accuracy of the data, the trends deduced from the heat transfer measurements. It was felt that this process eliminates only the inherent data scatter that can be attributed to experimental uncertainties. Since the basic data are reported, the reader can draw independent conclusions if desired.

TABLE III. SUMMARY OF DEDUCED TRANSITION ONSET AND END POINTS FOR $a = 0^o$

a = 0^o
M_∞ = 8
θ_c = 7.2^o L = 3.628'

				Onset				End			
				Lam. VIZAAD				Lam. VIZAAD			
GP.	R_{e_∞} (x 10^{-6})	R_N/R_B	T_W/T_G	X_{TR}/L	$R_{e_{ST}}$ (x 10^{-6})	$R_{e_{\theta_T}}$	M_e	X_{TR}/L	$R_{e_{ST}}$ (x 10^{-6})	$R_{e_{\theta_T}}$	M_e
1	3.79	0	.405	.19	3.93	726	6.76	.38	7.86	1065	6.76
11	3.02	0	.40	.264	4.36	784	6.76	.447	7.38	1039	6.76
22	2.18	0	.40	.36	4.29	790	6.75	.595	7.11	1028	6.76
32	1.35	0	.425	.504	3.63	730	6.74	.885	6.40	978	6.74
47	2.15	.01	.42	.504	5.867	968	6.77	.758	8.97	1181	6.81
42	1.36	.01	.432	.63	4.73	864	6.79	– –	– –	– –	– –
6	3.79	.02	.390	.504	8.25	1231	6.44	.72	13.36	1524	6.64
17	3.05	.02	.40	.504	6.85	1116	6.49	.76	11.69	1415	6.68
								.80	12.45	1456	6.69
27	2.20	.02	.40	.588	6.32	1053	6.62	.88	10.24	1309	6.74
37	1.35	.02	.432	.724	5.116	925	6.71	– –	– –		– –

TABLE IV. END OF TRANSITION (X/L)

$R_N = 0$

ϕ L = 43.54"

$R_{e_\infty} \times 10^{-6}$/ft	a	0°	45°	90°	135°	180°
3.79	0°	.380	.380	.380	.380	.380
	1	.338	.358	.390	.41	.415
	2	.295	.338	.415	.420	.425
	4	.252	.335	.420	.431	.431
3.05	0	.447	.447	.447	.447	.447
	1	.380	.41	.457	.479	.480
	2	.315	.380	.485	.495	.500
	4	.260	.465	.510	.515	.520
2.20	0	.595	.595	.595	.595	.595
	1	.465	.550	.605	.630	.635
	2	.375	.508	.635	.650	.660
	4	.330	.507	.678	.685	.690
1.35	0	.885	.885	.885	.885	.885
	1	.650	.847	.900	.940	.960
	2	.540	.847	.960	— —	— —
	4	.470	.929	— —	— —	— —

TABLE V. END OF TRANSITION (X/L)

$R_N/R_B = 0.01$ L = 43.54"

$R_{e_\infty} \times 10^{-6}$/ft	α	ϕ				
		0°	45	90	135	180
2.20	0°	.758	.758	.758	.758	.758
	1	.624	.765	.78	.765	.715
	2	.55	.678	.765	.724	.678
	4	.46	.635	.724	.724	.678
1.35	0	1.03				
	1	.80	.924			
	2	.635	.888			
	4	.58	.847			

TABLE VI. END OF TRANSITION (X/L)

$R_N/R_B = 0.02$ L = 43.54"

$R_{e_\infty} \times 10^{-6}$/ft	α	ϕ				
		0°	45	90	135	180
3.79	0°	.724	.724	.724	.724	.724
	1	.712	.78	.69	.635	.60
	2	.635	.76	.67	.59	.55
	4	.508	.593	.55	.49	.465
3.05	0	.785	.785	.785	.785	.785
	1	.765	.847	.75	.712	.705
	2	.678	.806	.70	.65	.64
	4	.55	.635	.635	.56	.53
2.20	0	.88	.88	.88	.88	.88
	1	.85	.929	.889	.82	.80
	2	.765	.889	.806	.74	.724
	4	.624	.765	.730	.62	.580

SECTION VI

CONCLUSIONS

An experimental investigation was conducted at Mach 8 in Tunnel B of the von Karman Facility at AEDC. The objective of these tests was to establish the asymmetric shape of the transition front on a cone at angle of attack. The model, instrumented with 100 thermocouples was a 7.2 degree half angle stainless steel cone with three nose configurations (i.e., R_N/R_B = 0, 0.01, and 0.02). For each configuration, data were obtained at four Reynolds numbers and for four angles of attack.

The transition front locations determined from this heat transfer phase indicated that the beginning of the turbulent region moved forward on the leeward side and aft on the windward meridian from the $\alpha = 0$ degree locations for the sharp cone model. On the side meridian, a slight rearward shift occurred. For $R_N/R_B = 0.01$, the turbulent front moved forward of the $\alpha = 0$ degree location on both the wind and lee meridians with the leeward side moving most forward. The side meridian location moved aft of the $\alpha = 0$ degree value. For $R_N/R_B = 0.02$, an apparent reversal occurred. The leeward transition front was aft of the $\alpha = 0$ degree location while the windward front was forward of this point. The maximum aft transition location occurred at $\phi = 45$ degrees. This reversal is not presently explained. However, other available ground test data at larger bluntness ratios typical of current R/Vs ($R_N > 0.25$") indicate trends similar to the sharp cone data obtained on the current test.

Comparisons of the $\alpha = 0$ degree heat transfer data were made with the GE-VIZAAD theory. In general, the data in the laminar region agrees well with the theory. In the turbulent regime, good agreement was noted between an all turbulent VIZAAD theory and the data for a region far downstream of the end of transition. A heat transfer overshoot (over the all turbulent theory) was noted in the vicinity of the end of transition. An instantaneous jump from a laminar to a turbulent theory, matching momentum thicknesses at the "transition" onset or end point, results in good agreement between prediction of the maximum heat transfer and the data.

SECTION VII

RECOMMENDATIONS

The objective of this phase of the STREET G task "Asymmetric Transition Effects on Vehicle Trim" is to establish, through experimental measurements, characteristic transition front shapes for a vehicle at small angle of attack. The results of these measurements will then be used to pattern the blowing schedule on a porous model (i.e., simulated ablation). Force and moment measurements are then to be obtained for several values of the blowing parameter, free stream Reynolds number, and angle of attack.

With the exception of the $R_N/R_B = 0.02$ results, the data obtained in this investigation agree with trends noted in available ground and flight test experiments. Furthermore, it was concluded that the sharp cone data will provide transition front shapes that will tend to maximize the incremental moment coefficient due to a skewed front. The force and moment data that will be obtained in Phase 2 of the current task will be used to establish whether the variations in static stability obtained in the wind tunnel are in agreement with trends measured in flight. That is, does the traversal of a skewed transition front produce a ΔC_m variation with axial station similar to that shown in Figure 70? Therefore, it is recommended that data be obtained for the Reynolds numbers and transition front shapes noted in Figure 71. The lower three Reynolds numbers were selected to establish the shape of the ΔC_m curve when the front lies aft of the center of gravity. The high Reynolds number case establishes the effect forward of the center of gravity.

REFERENCES

1. Test Facilities Handbook, AEDC, 7th Edition, July 1968, Arnold AF Station, Tennessee.

2. Studerus, C.J., Dienna, E.A., "Viscous Interaction Zero Angle of Attack Drag (VIZAAD) Program," GE TIS 64SD292, November 1964.

3. Lees, L., "Laminar Heat Transfer Over Blunt-Nosed Bodies at Hypersonic Flight Speeds," Jet Propulsion, April 1956.

4. Walker, G.K., "Turbulent Boundary Layers with Mass Addition," GE-RSD TFM No. 021, November 1963.

5. DiCristina, V., "Three-Dimensional Laminar Boundary Layer Transition on a Sharp 8 degree Cone at Mach No. 10," AIAA Paper No. 69-12, January 1969.

6. Stetson, K.F., and Rushton, G.H., "Shock Tunnel Investigation of Boundary Layer Transition at M = 5.5," AIAA Paper Vol. 5 No. 5 pp 899-906, May 1967.

7. DeCarlo, J., et al., "Mach 5 to 12 Inlet Development Program, Phase I - Data Report," Fairchild Hiller Report (FHR 2817-29-1).

8. McCauley, W.D., Saydah, A., Bueche, J., "The Effect of Controlled Three-Dimensional Reoughness on Hypersonic Laminar Boundary Layer Transition," AIAA Paper 66-26, January 1966.

9. Ericsson, L.E., "Effect of Boundary Layer Transition on Vehicle Dynamics," AIAA Paper 69-106, January 1969.

10. Maddalon, D.V., and Henderson, A. Jr., "Boundary Layer Transition at Hypersonic Mach Numbers," AIAA Paper 67-130, January 1967.

11. Bertram, M.H., and Beckwith, I.E., "NASA–Langley Boundary Layer Transition Investigations," Boundary Layer Transition Study Group Meeting, Vol. III Section 18, August 1967.

APPENDIX A. GENERAL HEAT TRANSFER PROGRAM TUNNELS A, B, AND C VON KARMAN FACILITY, AEDC

GENERAL

The program computations and print-out outlined in this memo will be used to reduce Tunnels A, B, and C heat transfer data, effective this date. Future program changes will be distributed to all recipients of this memo.

NOMENCLATURE

A	Constant
b	Model skin thickness, ft
c	Model skin specific heat, Btu/lb-°R
D	Model characteristic length, ft
E	Thermocouple output, mvolts
h_T	Heat transfer coefficient, Btu/ft^2-sec-°R
h_H	Heat transfer coefficient, $\frac{\text{Btu/ft}^2\text{-sec}}{\text{Btu/lb}}$
H	Air enthalpy, Btu/lb
k	Model skin conductivity coefficient, Btu/ft-sec-°R
M	Mach number
p	Pressure, psia
q	Dynamic pressure, psia
Q	Heat transfer rate per unit area, Btu/ft^2-sec
r	Model nose radius, ft
Re	Free-stream unit Reynolds number, ft^{-1}
Re_D	Reynolds number based on D
St	Stanton number
t	Time, sec.
T	Temperature, °R or °F
V	Velocity, ft/sec
w	Model skin density, lb/ft^3
α	Angle of attack, deg
β	Sideslip angle, deg
ϕ	Roll angle, deg
ψ	Yaw angle, deg
μ	Air viscosity, lb-sec/ft^2
ρ	Air density, slug/ft^3

Subscripts

FR	Computed from Fay-Riddell theory
m	Model angle
o	Tunnel stagnation conditions
p	Sting prebend angle
s	Sector angle
w	Model wall conditions
∞	Tunnel free-stream conditions

Superscript

'	Conditions downstream of a normal shock

IMPUTS

1. Program Inputs

a. Listed for each project number
Project number
Project engineer
Data reduction times (maximum of 5 times, listed relative to centerline time)

b. Listed for each model configuration
Model configuration number

$$\left.\begin{matrix}A_0\\A_1\\A_2\\A_3\end{matrix}\right\}\begin{array}{l}\text{where } c_1 = A_0 + A_1T_w + A_2T_w^2 + A_3T_w^3\\\text{(model material 1)}\end{array}$$

$$\left.\begin{matrix}A_0^*\\A_1\\A_2\\A_3\end{matrix}\right\}\begin{array}{l}\text{where } c_2 = A_0 + A_1T_w + A_2T_w^2 + A_3T_w^3\\\text{(model material 2)}\end{array}$$

Note: *Zero indicates entire model is one material

$$\left.\begin{array}{l} A_0 \\ A_1 \\ A_2 \end{array}\right\} \text{where } k_1 = A_0 + A_1T_w + A_2T_w^2$$

$$\left.\begin{array}{l} A_0 \\ A_1 \\ A_2 \end{array}\right\} \text{where } k_2 = A_0 + A_1T_w + A_2T_w^2$$

r, ft*

$$\left.\begin{array}{l} A_0 \\ A_1 \end{array}\right\} \text{Where } w_1 = A_0 + A_1T_w$$

$$\left.\begin{array}{l} A_0 \\ A_1 \end{array}\right\} \text{where } w_2 = A_0 + A_1T_w$$

c. Listed for each thermocouple
Thermocouple number
Model material (1 or 2)

b, ft
D, ft**

Notes: *Zero indicates do not compute or tabulate St_{FR} or or tabulate St/St_{FR}
**Zero indicates do not compute Re_D or tabulate $St\sqrt{Re_D}$

2. Tape Inputs

Position	Channel	Input
00	100	Gp. no.
01	101	Run no.
02	102	Mach no.
03	103	α_p
04	104	Date
05	105	Config.
06	119	℄ indicate bit
07	107	Time accumulator input, high
08	108	Time accumulator input, low

Position	Channel	Input
09	115	α_s input, high
10	116	α_s input, low
11	117	ϕ_s input, high
12	118	ϕ_s input, low
13	114	p_o range indicate
14	106	Thermocouple switch position indicate
15	109	Spare
16	110	Spare
17	111	Spare
18	112	Spare
19	113	Spare
20	00	p_o input
21	01	Model thermocouple
.	.	.
.	.	.
.	.	.
118	98	Model thermocouple
119	99	T_o input

DATA REDUCTION PROCEDURE

1. Compute for Each Data Reduction Time

$$\alpha_s^{*} = (\alpha_{reading} - \alpha_{zero})(1/300), \text{ deg}$$

$$\phi_s = (\phi_{reading} - \phi_{zero})(1/64), \text{ deg}$$

$$\alpha_m = \tan^{-1}(\tan\alpha_s \cos\phi_s) + \alpha_p, \text{ deg}$$

$$\psi_m = -\beta_m = -\sin^{-1}(\sin\alpha_s \sin\phi_s), \text{ deg}$$

$$p_o = (p_{o_{reading}} - p_{o_{zero}}) \text{ (scale factor), psia}$$

$$T_o^{**} = 128.485 + 44.8278E + 0.0811857E^2 - 0.0170464E^3 + 0.000632876E^4 - 0.00000710569E^5 + 460, \ {}^{o}R$$

$$H_o = 4.875 + 0.2235\,T_o + 0.0000135\,T_o^2, \text{ Btu/lb}$$

$$\mu_o = 2.270\,T_o^{1.5}(T_o + 198.6)^{-1} \times 10^{-8}, \text{ lb-sec/ft}^2$$

M_∞ = manual input, scan position 02, xx, xx

$$T_\infty / T_o^{***} = (1 + 0.2\,M_\infty^2)^{-1}$$

$$p_\infty / p_o^{***} = (1 + 0.2\,M_\infty^2)^{-3.5}$$

$$p_o' / p_o^{***} = \left(\frac{6\,M_\infty^2}{M_\infty^2 + 5}\right)^{3.5} \left(\frac{6}{7\,M_\infty^2 - 1}\right)^{2.5}$$

$$T_\infty = \left(\frac{T_\infty}{T_o}\right) (T_o),\ ^\circ R$$

$$p_\infty = \left(\frac{p_\infty}{p_o}\right) (p_o),\ \text{psia}$$

$$p_o' = \left(\frac{p_o'}{p_o}\right) (p_o),\ \text{psia}$$

$$q_\infty = 0.7\,M_\infty^2\,p_\infty,\ \text{psia}$$

$$V_\infty = 49\,M_\infty^{2'}\,(T_\infty)^{0.5},\ \text{ft/sec}$$

$$\rho_\infty = 0.0839\,p_\infty\,(T_\infty)^{-1},\ \text{slugs/ft}^3$$

$$\mu_\infty = 8.051 \times 10^{-10}\,T_\infty,\ \text{lb-sec/ft}^2$$

$$Re_\infty = \rho_\infty V_\infty (\mu_\infty)^{-1},\ \text{ft}^{-1}$$

$$St_{FR} = \frac{0.254}{\rho_\infty V_\infty r^{0.5}} \quad \frac{\mu_o^{0.4}}{T_o^{0.15}} \quad (p_o')^{0.5}$$

Wall temperature $= A_0 + A_1 E + A_2 E^2 + A_3 E^3$

where, for Chromel-Alumel thermocouples

T_w, ^oF	A_0	A_1	A_2	A_3
0 to 270	132.159	43.5164	-0.295017	0.08131300
270 to 1000	122.453	47.1061	-0.237774	0.00377667
1000 to 1500	145.669	44.4543	-0.144298	0.00284639

or, for Iron-Constantan thermocouples

0 to 238	132.065	33.8251	-0.2213290	0.027791600
238 to 786	134.831	32.6871	-0.0250407	-0.000894075
786 to 1200	120.596	32.8380	0.0638280	-0.002162250

Notes: *For Tunnel A

$$\alpha_s = (\alpha_{reading} - \alpha_{zero})\,(1/100),\ \text{deg}$$

**For Tunnel A

$$T_o = -\,64.4605 + 141.503E - 38.2537E^2 + 7.18724E^3 - 0.680267E^4 + 0.0256285E^5 + 460,\ ^oR$$

***For Tunnel C

$$T_\infty/T_o = (1 + 0.2\,M_\infty^2)^{-1}\,[0.9378 - 3.900 \times 10^{-6}\,p_o + (6533 + 0.6547\,p_o - 0.4137\,T_o - 0.0001354\,p_o T_o)(10^{-8})\,T_o]$$

$$p_\infty/p_o = (1 + 0.2\,M_\infty^2)^{-3.5}\,[1.0562 + 49.57 \times 10^{-6}\,p_o - (3523 + 1.8300\,p_o + 1.3839\,T_o - 0.0002196\,p_o T_o)(10^{-8})\,T_o]$$

$$p_o'/p_o = \left(\frac{6\,M_\infty^2}{M_\infty^2 + 5}\right)^{3.5} \left(\frac{6}{7\,M_\infty^2 - 1}\right)^{2.5} \Big[1.0419 + 38.31 \times 10^{-6} p_o$$

$$- (1968 + 0.7925\, p_o + 1.6905\, T_o)(10^{-8})\, T_o\Big]$$

2. Computed for Each Thermocouple at Each Data Reduction Time

T_w, °R, and $\frac{dT_w}{dt}$, °R/sec, are computed from the center of a least-squares parabola through 21 consecutive wall temperature points.

$$Q = whc\,\frac{dT_w}{dt}\,,\ \text{Btu/ft}^2\text{-sec}$$

$$h_T = \frac{Q}{T_o - T_w}\,,\ \text{Btu/ft}^2\text{-sec-}^\circ\text{R}$$

$$H_w = 4.875 + 0.2235\,T_w + 0.0000135\,T_w^2,\ \text{Btu/lb}$$

$$h_H = \frac{Q}{H_o - H_w}\,,\ \frac{\text{Btu/ft}^2\text{ - sec}}{\text{Btu/lb}}$$

$$St = \frac{h_H}{\rho_\infty V_\infty}\left(\frac{1}{32.17}\right)$$

$$\frac{St}{St_{FR}}$$

$$Re_D = Re_\infty D$$

$$St\sqrt{Re_D}$$

TABULATED DATA

1. Tabulated for Each Data Reduction Time

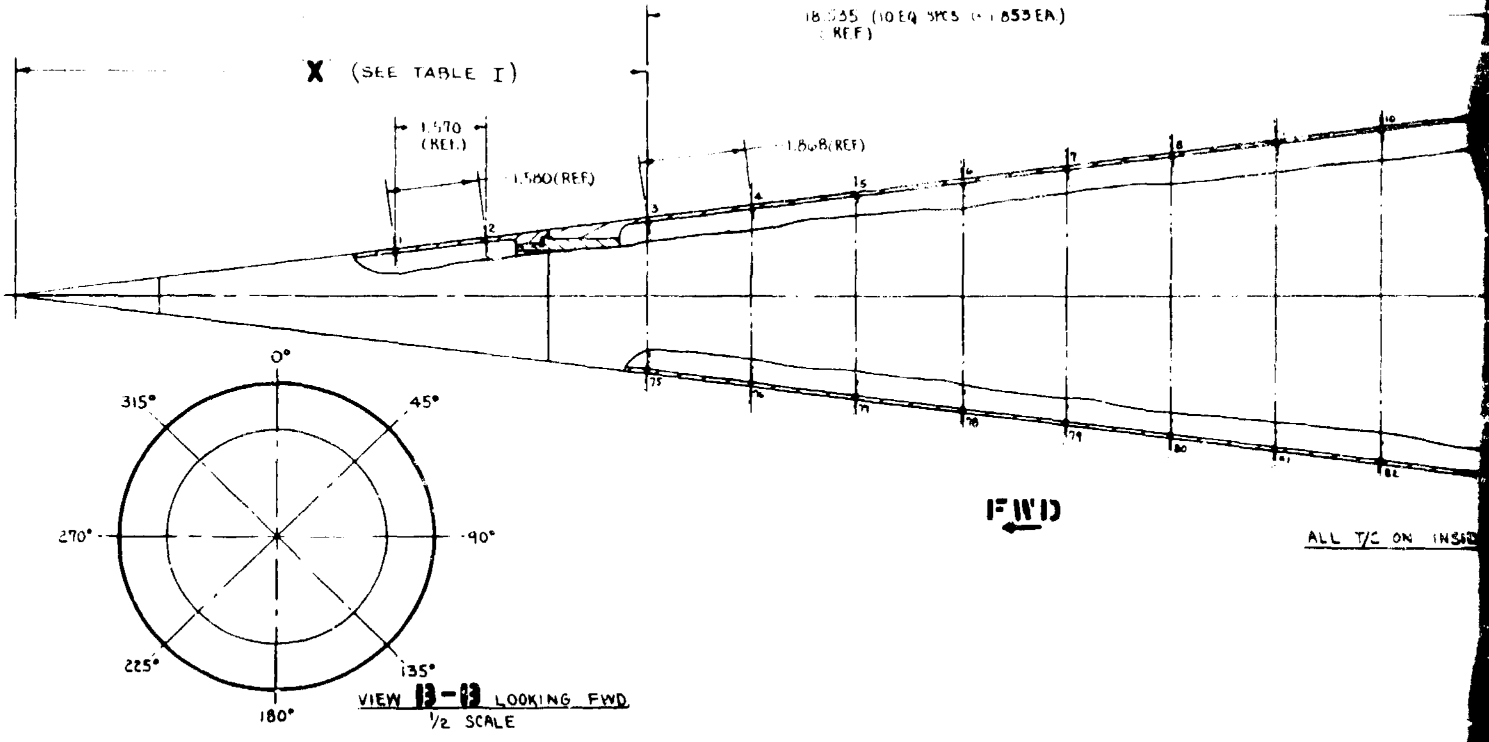
Gp. No.	α_s, deg	α_m, deg	ϕ_s, deg	ψ_m, deg	Date	Config.	Time, sec.	Mach No.	p_o, psia	T_o, ^oR

T_∞, ^oR	p_∞, psia	q_∞, psia	V_∞, ft/sec	ρ_∞, $slug/ft^3$	μ_∞, $lb\text{-}sec/ft^2$	Re_∞, ft^{-1}	St_{FR}

2. Tabulated for Each Thermocouple at Each Data Reduction Time

TC No.	T_w, ^oR	$\frac{dT_w}{dt}$, $^oR/sec$	Q, $\frac{Btu}{ft^2 - sec}$	H_T, $\frac{Btu}{ft^2 - sec - ^oR}$	h_H, $\frac{Btu/ft^2\text{-}sec}{Btu/lb}$	H_w, Btu/lb

St	$\frac{St}{St_{FR}}$	$St\sqrt{Re_D}$


X (SEE TABLE I)
18.535 (10 EQ SPCS @ 1.853 EA.) (REF)
1.570 (REF.)
1.580 (REF)
1.868 (REF)
1
2
3
4
5
6
7
8
10
75
76
77
78
79
80
82
FWD
ALL T/C ON INS
0°
45°
90°
135°
180°
225°
270°
315°
VIEW B-B LOOKING FWD
1/2 SCALE

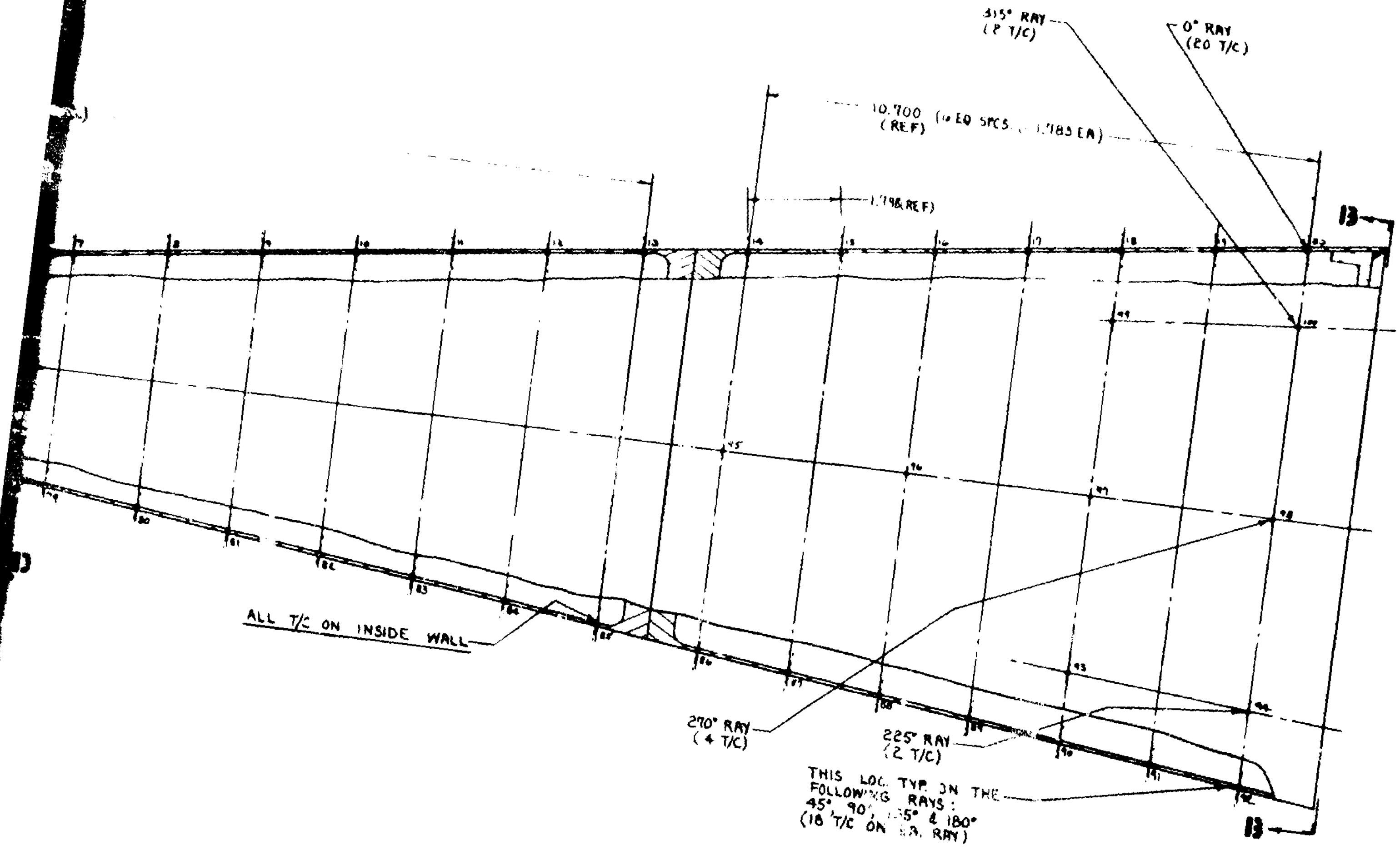


Figure 1. Model Used in Heat Transfer Test

2

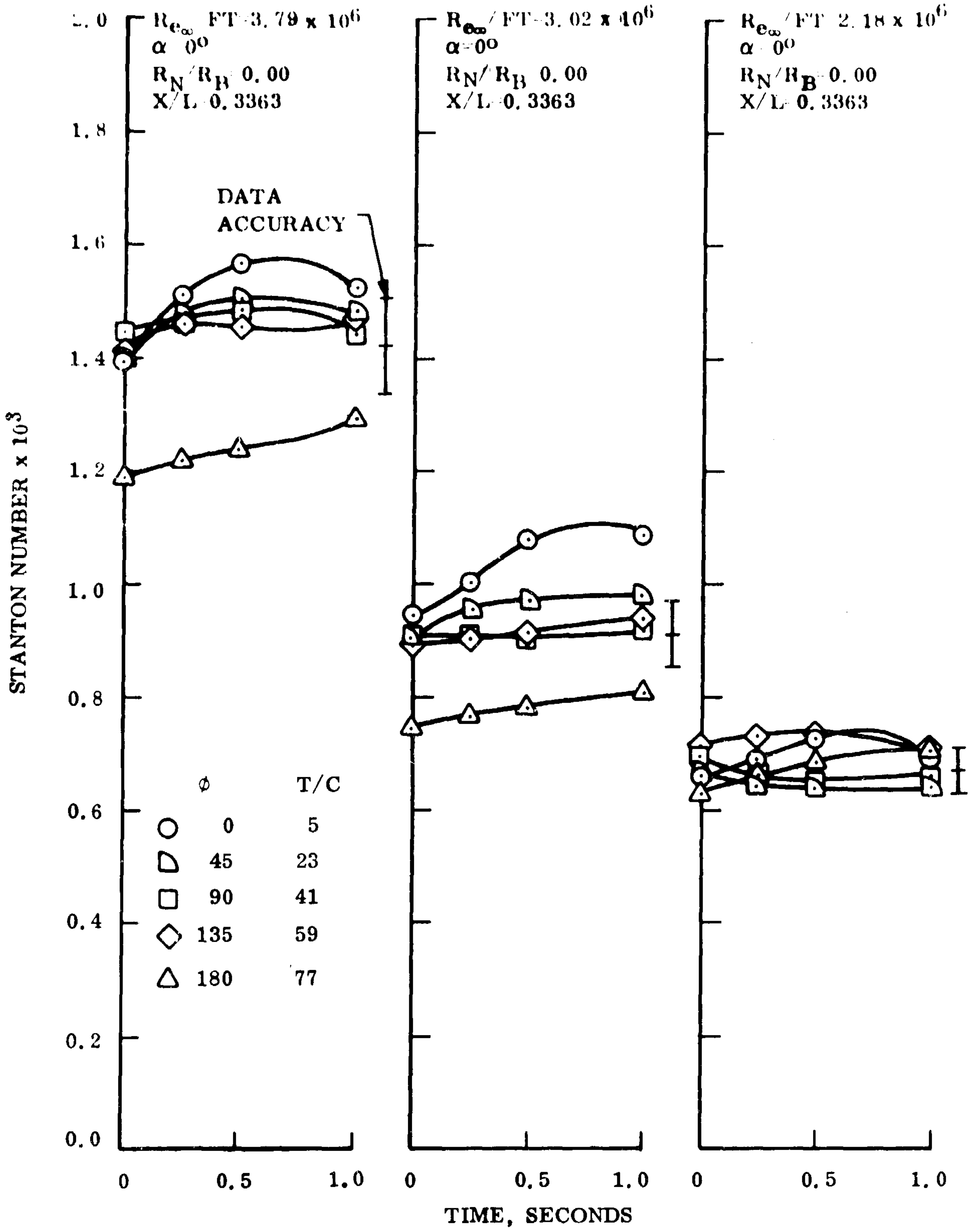


Figure 2. Stanton Number vs. Time for Selected X/L Locations, X/L = .3363

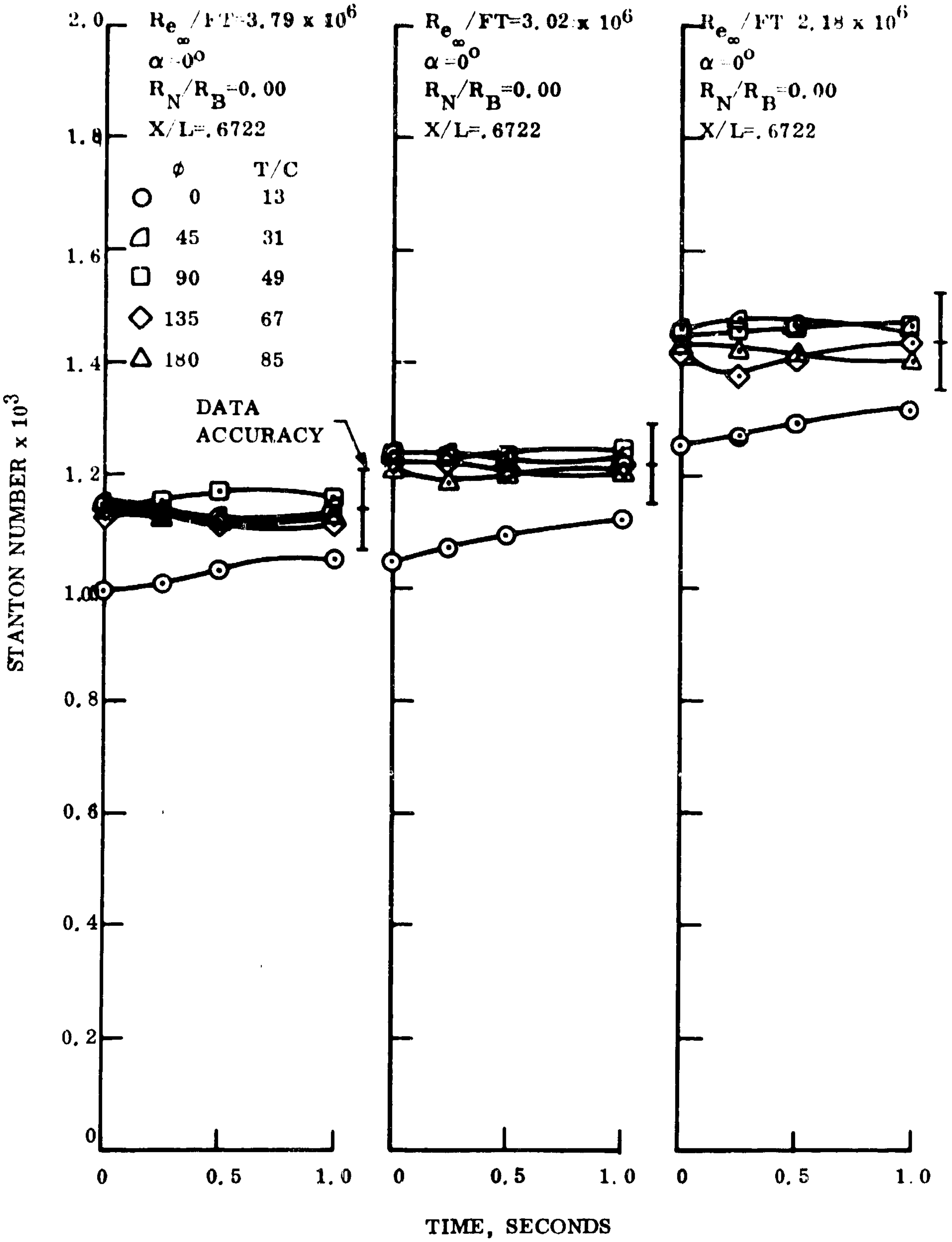


Figure 3. Stanton Number vs. Time for Selected X/L Locations, X/L = .6722

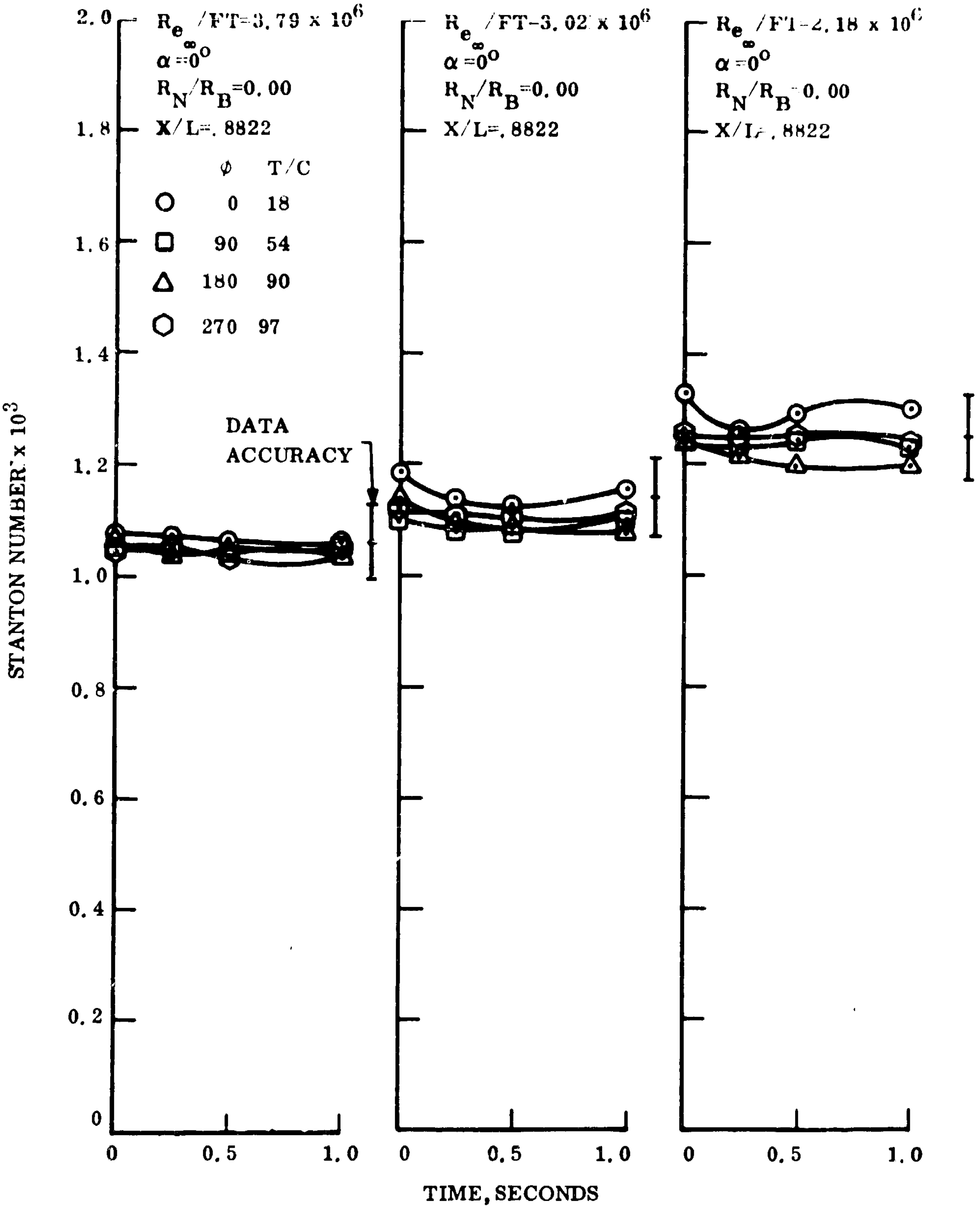


Figure 4. Stanton Number vs. Time for Selected X/L Locations, X/L = .8822

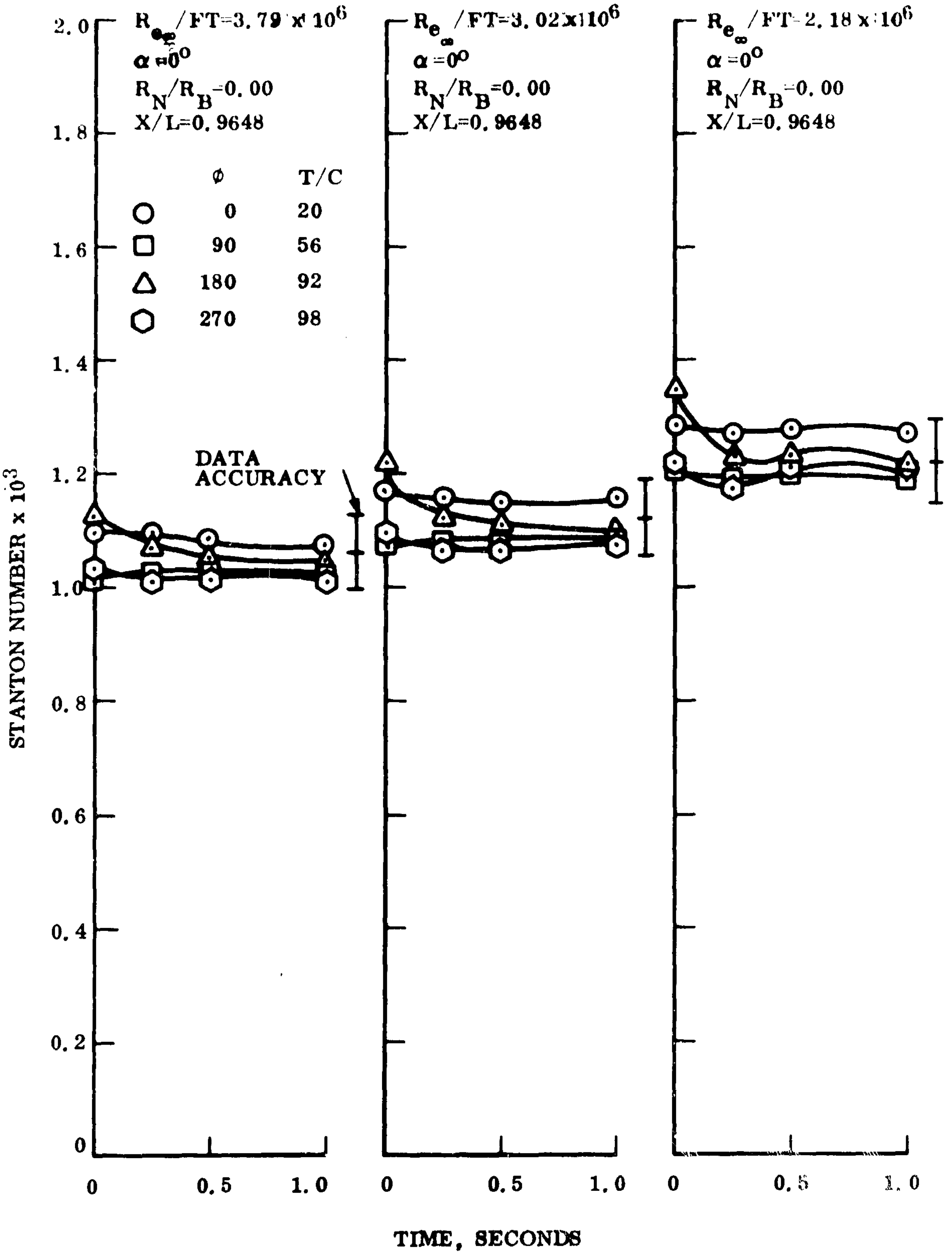


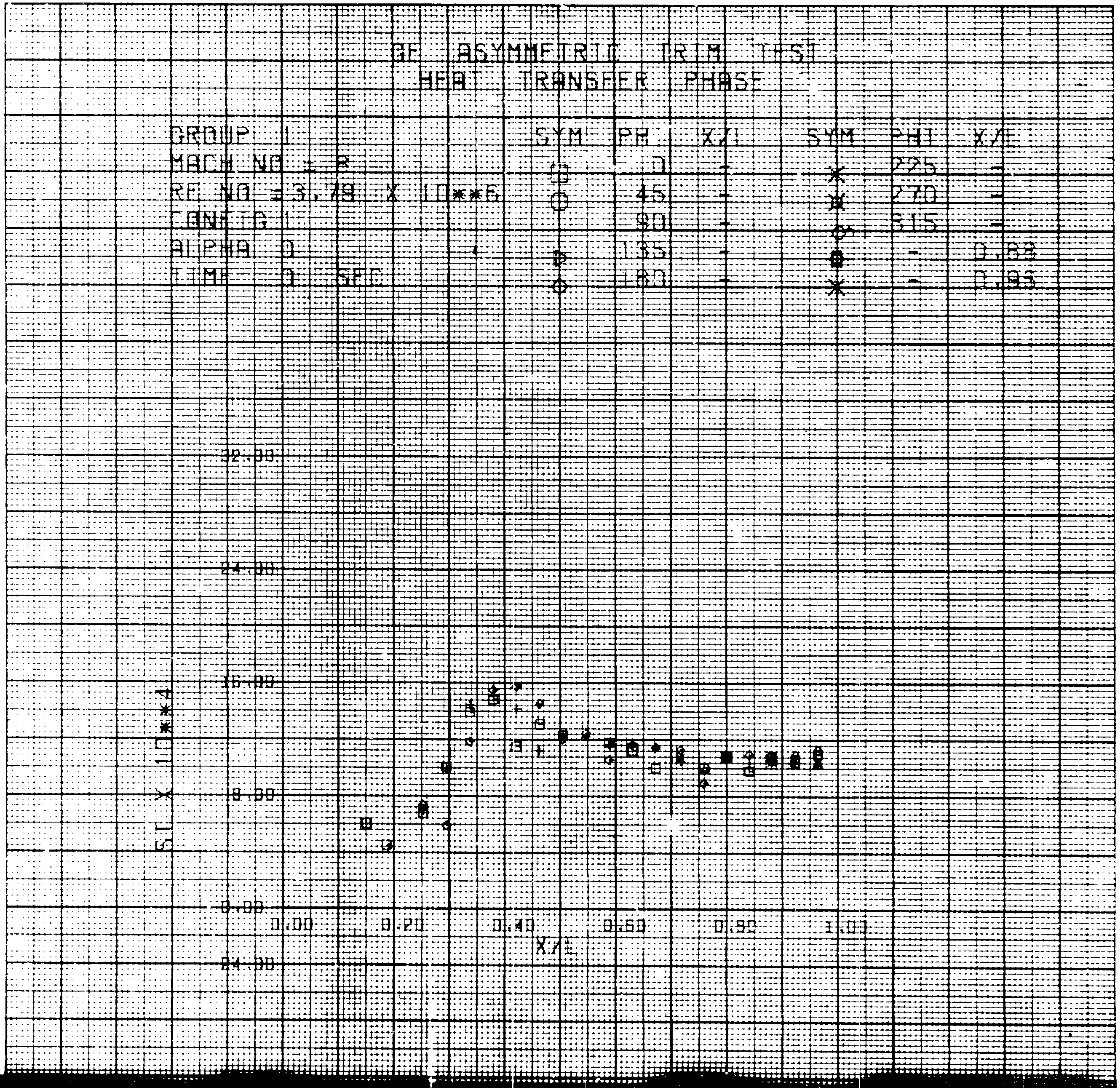
Figure 5. Stanton Number vs. Time for Selected X/L Locations. X/L = .9648

```
                                              7/14/69

                              AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                               VON KARMAN GAS DYNAMICS FACILITY
                                 50 INCH HYPERSONIC TUNNEL B
                                         VT0967-000
GROUP   CONFIG      ALPHA-N        BETA-N        ALPHA-S       ROLL    ALP-P   DATE       MACH NO         PO            TO           TIME
   1       1            .05            0             .05          0        0    714          8.00         850.19       1332.35         -.00
   T-INF         P-INF           Q-INF          V-INF        RHO-INF         MU-INF           RE/FT           HE/D            HU
 9.08472E 01  8.02044E-02  3.94354E 00  3.85173E 03  7.64954E-05  7.77362E-08  3.79055E 06  3.47667E 06  3.26598E 02

TC NO    X/L      PHI     TEMP      SLOPE          Q-STOR        HT           HM           HW           ST

   1    .1909       0    535.06   5.1972E 00   1.1290E 00   1.4184E-03   5.7820E-03   1.2851E 02   6.0158E-04
   2    .1667       0    537.37   3.4220E 00   8.3936E-01   1.0558E-03   4.2447E-03   1.2808E 02   4.4776E-04
   3    .2524       0    539.67   4.2690E 00   1.2622E 00   1.5923E-03   6.4606E-03   1.2942E 02   6.7519E-04
   4    .2943       0    537.34   5.9632E 00   1.8822E 00   2.3675E-03   9.5179E-03   1.2887E 02   1.0040E-03
   5    .3363       0    538.70   8.2614E 00   2.6075E 00   3.2855E-03   1.3208E-02   1.2919E 02   1.3932E-03
   6    .3783       0    540.51   9.2169E 00   2.7706E 00   3.4989E-03   1.4064E-02   1.2962E 02   1.4836E-03
   7    .4203       0    537.62   7.4635E 00   2.1511E 00   2.7061E-03   1.0879E-02   1.2889E 02   1.1476E-03
   8    .4623       0    540.64   8.8636E 00   2.4422E 00   3.0847E-03   1.2309E-02   1.2965E 02   1.3079E-03
   9    .5043       0    539.75   8.5879E 00   2.3017E 00   2.9040E-03   1.1673E-02   1.2944E 02   1.2314E-03
  10    .5463       0    530.09  -1.9131E-02  -4.2455E-03  -5.2972E-06  -2.1309E-05   1.2733E 02  -2.2473E-06
  11    .5882       0    541.50   7.0552E 00   2.1919E 00   2.7719E-03   1.1141E-02   1.2988E 02   1.1752E-03
  12    .6302       0    542.60   7.7051E 00   2.0845E 00   2.6398E-03   1.0610E-02   1.3014E 02   1.1192E-03
  13    .6722       0    545.89   7.3814E 00   1.8492E 00   2.3489E-03   9.4391E-03   1.3071E 02   9.9571E-04
  99    .8822   315.0   [illegible]   5.5298E 00   1.4405E 00   1.8261E-03   7.3389E-03   1.3034E 02   7.7417E-04
  15    .7583       0    547.63   7.7089E 00   1.8530E 00   2.3624E-03   9.4922E-03   1.3132E 02   1.0013E-03
  16    .7996       0    547.08   7.1019E 00   1.9926E 00   2.5401E-03   1.0209E-02   1.3138E 02   1.0766E-03
  17    .8409       0    547.09   7.0772E 00   1.8083E 00   2.3028E-03   9.2529E-03   1.3119E 02   9.7607E-04
  18    .8822       0    549.92   7.4990E 00   1.9791E 00   2.5294E-03   1.0164E-02   1.3184E 02   1.0719E-03
  19    .9235       0    550.00   7.8669E 00   1.[illegible]7E 00   2.4550E-03   9.8631E-03   1.3188E 02   1.0404E-03
  20    .9648       0    552.09   8.4136E 00   2.0233E 00   2.5931E-03   1.0417E-02   1.3238E 02   1.0988E-03
  21    .2524    45.0    537.61   2.1177E 00   6.2601E-01   7.8769E-04   3.1667E-03   1.2893E 02   3.3405E-04
  22    .2943    45.0    536.66   5.8024E 00   1.8860E 00   2.3703E-03   9.5296E-03   1.2871E 02   1.0053E-03
  23    .3363    45.0    539.05   8.6863E 00   2.6111E 00   3.2914E-03   1.3231E-02   1.2928E 02   1.3957E-03
  24    .3783    45.0    541.97   9.2984E 00   2.7927E 00   3.5334E-03   1.4201E-02   1.2997E 02   1.4981E-03
  25    .4203    45.0    540.27   8.6749E 00   2.3461E 00   2.9618E-03   1.1905E-02   1.2956E 02   1.2559E-03
  26    .4623    45.0    543.18   8.5576E 00   2.4011E 00   3.0425E-03   1.2229E-02   1.3026E 02   1.2899E-03
  27    .5043    45.0    545.20   8.7744E 00   2.3301E 00   2.9601E-03   1.1895E-02   1.3074E 02   1.2548E-03
 100    .9648   315.0    554.14   7.7246E 00   1.8576E 00   2.3871E-03   9.5880E-03   1.3288E 02   1.0114E-03
  29    .5882    45.0    545.48   8.1383E 00   2.2423E 00   2.8497E-03   1.1451E-02   1.3081E 02   1.2080E-03
  30    .6302    45.0    546.82   7.8807E 00   2.1321E 00   2.7141E-03   1.0906E-02   1.3112E 02   1.1504E-03
  31    .6722    45.0    550.89   8.6262E 00   2.1175E 00   2.7096E-03   1.0885E-02   1.3210E 02   1.1483E-03
  32    .7170    45.0    552.57   8.1818E 00   1.9267E 00   2.4709E-03   9.9243E-03   1.3250E 02   1.0470E-03
  33    .7583    45.0    551.27   7.1774E 00   1.9776E 00   2.5319E-03   1.0171E-02   1.3219E 02   1.0729E-03
  34    .7996    45.0    551.85   7.8164E 00   1.9607E 00   2.5223E-03   1.0132E-02   1.3232E 02   1.0688E-03
  35    .8409    45.0    553.37   7.0860E 00   1.9173E 00   2.4613E-03   9.8863E-03   1.3269E 02   1.0429E-03
  36    .8822    45.0    554.07   7.0992E 00   1.8673E 00   2.3992E-03   9.6368E-03   1.3289E 02   1.0166E-03
  37    .9235    45.0    554.18   7.3667E 00   1.8669E 00   2.3989E-03   9.6353E-03   1.3286E 02   1.0164E-03
  38    .9648    45.0    555.86   7.2957E 00   1.7545E 00   2.2595E-03   9.0746E-03   1.3328E 02   9.5726E-04
  39    .2524    90.0    541.42   4.3875E 00   1.2970E 00   1.6399E-03   6.5912E-03   1.2984E 02   6.9529E-04
  40    .2943    90.0    541.49   5.7774E 00   1.8524E 00   2.3422E-03   9.4141E-03   1.2986E 02   9.9307E-04
  41    .3363    90.0    543.50   8.5271E 00   2.6914E 00   3.4118E-03   1.3712E-02   1.3034E 02   1.4464E-03
  42    .3783    90.0    543.82   8.8977E 00   2.8084E 00   3.5615E-03   1.4313E-02   1.3041E 02   1.5099E-03
  43    .4203    90.0    544.79   8.4032E 00   2.6319E 00   3.3418E-03   1.3429E-02   1.3064E 02   1.4167E-03
  44    .4623    90.0    541.77   6.7256E 00   2.0892E 00   2.6426E-03   1.0622E-02   1.2992E 02   1.1206E-03
  45    .5043    90.0    545.49   8.2620E 00   2.2764E 00   2.8931E-03   1.1626E-02   1.3081E 02   1.2264E-03
  46    .5463    90.0    545.31   7.9427E 00   2.2682E 00   2.8819E-03   1.1581E-02   1.3077E 02   1.2217E-03
  47    .5882    90.0    546.72   7.7035E 00   2.1615E 00   2.7512E-03   1.1055E-02   1.3110E 02   1.1662E-03
  48    .6302    90.0    547.79   7.8418E 00   2.1606E 00   2.7539E-03   1.1065E-02   1.3136E 02   1.1672E-03
  49    .6722    90.0    550.33   7.6158E 00   2.1083E 00   2.6960E-03   1.0831E-02   1.3196E 02   1.1425E-03
  50    .7170    90.0    552.34   8.2060E 00   1.9326E 00   2.4777E-03   9.9527E-03   1.3244E 02   1.0499E-03
  51    .7583    90.0    548.40   7.0039E 00   1.8245E 00   2.3273E-03   9.3508E-03   1.3150E 02   9.8646E-04
  52    .7996    90.0    549.79   7.6214E 00   1.9880E 00   2.5406E-03   1.0206E-02   1.3183E 02   1.0766E-03
  53    .8409    90.0    549.54   7.6559E 00   1.9179E 00   2.[illegible]1E-03   9.8434E-03   1.3177E 02   1.0384E-03
  54    .8822    90.0    550.39   7.8758E 00   1.9333E [illegible]-03   9.9374E-03   1.3198E 02   1.0477E-03
  55    .9235    90.0    550.15   8.0149E 00   1.92[illegible]-03   9.8994E-03   1.3192E 02   1.0443E-03
  56    .9648    90.0    550.82   7.8393E 00   1.8[illegible]-03   9.6905E-03   1.3208E 02   1.0222E-03
  57    .2524   135.0    533.75   1.3500E 00   3.9[illegible]-04   2.0094E-03   1.2802E 02   2.1197E-04
  58    .2943   135.0    536.49   5.4527E 00   1.7[illegible]   2.1966E-03   8.8314E-03   1.2866E 02   9.3161E-04
  59    .3363   135.0    537.62   8.6020E 00   2.6519E 00   3.3369E-03   1.3415E-02   1.2893E 02   1.4151E-03
  60    .3783   135.0    538.15   9.2536E 00   2.8745E 00   3.6194E-03   1.4550E-02   1.2906E 02   1.5349E-03
  61    .4203   135.0    538.22   9.3904E 00   2.8228E 00   3.5545E-03   1.4289E-02   1.2908E 02   1.5074E-03
  62    .4623   135.0    538.02   9.1924E 00   2.4385E 00   3.0699E-03   1.2341E-02   1.2903E 02   1.3018E-03
  63    .5043   135.0    539.59   8.9741E 00   2.2930E 00   2.8924E-03   1.1627E-02   1.2940E 02   1.2265E-03
  64    .5463   135.0    539.85   8.7168E 00   2.3148E 00   2.9208E-03   1.1741E-02   1.2947E 02   1.2385E-03
  65    .5882   135.0    541.26   9.3301E 00   2.2120E 00   2.7962E-03   1.1239E-02   1.2980E 02   1.1856E-03
  66    .6302   135.0    541.00   8.2635E 00   2.1944E 00   2.7729E-03   1.1146E-02   1.2974E 02   1.1757E-03
  67    .6722   135.0    545.89   8.6924E 00   2.0903E 00   2.6579E-03   1.0680E-02   1.3090E 02   1.1267E-03
  68    .7170   135.0    546.39   8.4036E 00   1.9790E 00   2.5179E-03   1.0118E-02   1.3102E 02   1.0673E-03
  69    .7583   135.0    539.43   5.2823E 00   1.4821E 00   1.8692E-03   7.5137E-03   1.2937E 02   7.9260E-04
  70    .7996   135.0    543.12   7.4374E 00   2.1610E 00   2.7381E-03   1.1005E-02   1.3025E 02   1.1608E-03
  71    .8409   135.0    543.35   7.0816E 00   1.9512E 00   2.4730E-03   9.9388E-03   1.3030E 02   1.0484E-03
  72    .8822   135.0    543.90   7.4262E 00   2.0091E 00   2.5481E-03   1.0240E-02   1.3043E 02   1.0802E-03
  73    .9235   135.0    545.02   7.8557E 00   1.9283E 00   2.4492E-03   9.8424E-03   1.3070E 02   1.0383E-03
  74    .9648   135.0    547.01   8.2667E 00   1.9880E 00   2.5314E-03   1.0171E-02   1.3117E 02   1.0730E-03
  75    .2524   180.0    535.00   4.7300E 00   1.3743E 00   1.7312E-03   6.9595E-03   1.2914E 02   7.3415E-04
  76    .2943   180.0    536.61   3.4480E 00   1.1055E 00   1.3893E-03   5.5854E-03   1.2870E 02   5.8919E-04
  77    .3363   180.0    539.14   7.5062E 00   2.2189E 00   2.7974E-03   1.1245E-02   1.2930E 02   1.1862E-03
  78    .3783   180.0    541.36   9.6147E 00   2.8902E 00   3.6539E-03   1.4686E-02   1.2983E 02   1.5492E-03
  79    .4203   180.0    543.29   9.0020E 00   2.9271E 00   3.7096E-03   1.4909E-02   1.3028E 02   1.5727E-03
  80    .4623   180.0    544.19   [illegible]   2.7007E 00   3.4263E-03   1.3770E-02   1.3049E 02   1.4525E-03
  81    .5043   180.0    544.17   8.[illegible]E 00   2.2315E 00   2.8312E-03   1.1378E-02   1.3050E 02   1.2002E-03
  82    .5463   180.0    544.37   8.7[illegible]E 00   2.3196E 00   2.9374E-03   1.1805E-02   1.3054E 02   1.2452E-03
  83    .5882   180.0    544.21   7.40[illegible]E 00   1.[illegible]E 00   2.4966E-03   1.0033E-02   1.3050E 02   1.0584E-03
  84    .6302   180.0    547.18   9.0990E 00   2.[illegible]E 00   2.[illegible]93E-03   1.1007E-02   1.3121E 02   1.1611E-03
  85    .6722   180.0    551.36   8.7500E 00   2.[illegible]E 00   2.6905E-03   1.0824E-02   1.3220E 02   1.1418E-03
  86    .7170   180.0    552.45   8.7957E 00   2.07[illegible]E 00   2.6558E-03   1.0648E-02   1.3247E 02   1.1254E-03
  87    .7583   180.0    545.37   6.8680E 00   1.65[illegible]E 00   2.0947E-03   8.4315E-03   1.3078E 02   8.8963E-04
  88    .7996   180.0    547.87   7.4138E 00   1.98[illegible]E 00   2.5283E-03   1.0159E-02   1.3134E 02   1.0716E-03
  89    .8409   180.0    548.28   7.9107E 00   2.0213E 00   2.5779E-03   1.0358E-02   1.3147E 02   1.0926E-03
  90    .8822   180.0    548.95   8.5860E 00   1.9786E 00   2.5256E-03   1.01[illegible]E-02   1.3163E 02   1.0704E-03
  91    .9235   180.0    549.18   8.7833E 00   2.0137E 00   2.5709E-03   1.03[illegible]E-02   1.3167E 02   1.0896E-03
  92    .9648   180.0    552.36   8.0837E 00   2.0702E 00   2.6541E-03   1.06[illegible]E-02   1.3245E 02   1.1247E-03
  93    .8822   225.0    548.89   7.5315E 00   1.9244E 00   2.4562E-03   9.86[illegible]E-03   1.3162E 02   1.0410E-03
  94    .9648   225.0    551.58   7.9724E 00   1.9172E 00   2.4555E-03   9.86[illegible]E-03   1.3226E 02   1.0406E-03
  95    .7170   270.0    554.45   6.6078E 00   1.9587E 00   2.5179E-03   1.0113E-02   1.3295E 02   1.0668E-03
  96    .7996   270.0    552.13   7.6810E 00   1.9866E 00   2.5462E-03   1.0228E-02   1.3233E 02   1.0789E-03
  97    .8822   270.0    551.49   7.9399E 00   1.9265E 00   2.4472E-03   9.9111E-03   1.3224E 02   1.0455E-03
  98    .9648   270.0    553.96   7.8426E 00   1.9188E 00   2.3506E-03   9.8430E-03   1.3259E 02   1.0384E-03
```

GF ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

GROUP 1 SYM PHI X/L SYM PHI X/L


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 1
MACH NO = 8
RE NO = 3.79 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PH X/L
□ 0 -
○ 45 -
△ 90 -
◇ 135 -
◇ 180 -
SYM PHI X/L
✳ 225 -
⊠ 270 -
◇ 315 -
■ - 0.83
✳ - 0.95
32.00
24.00
16.00
8.00
0.00
24.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

2

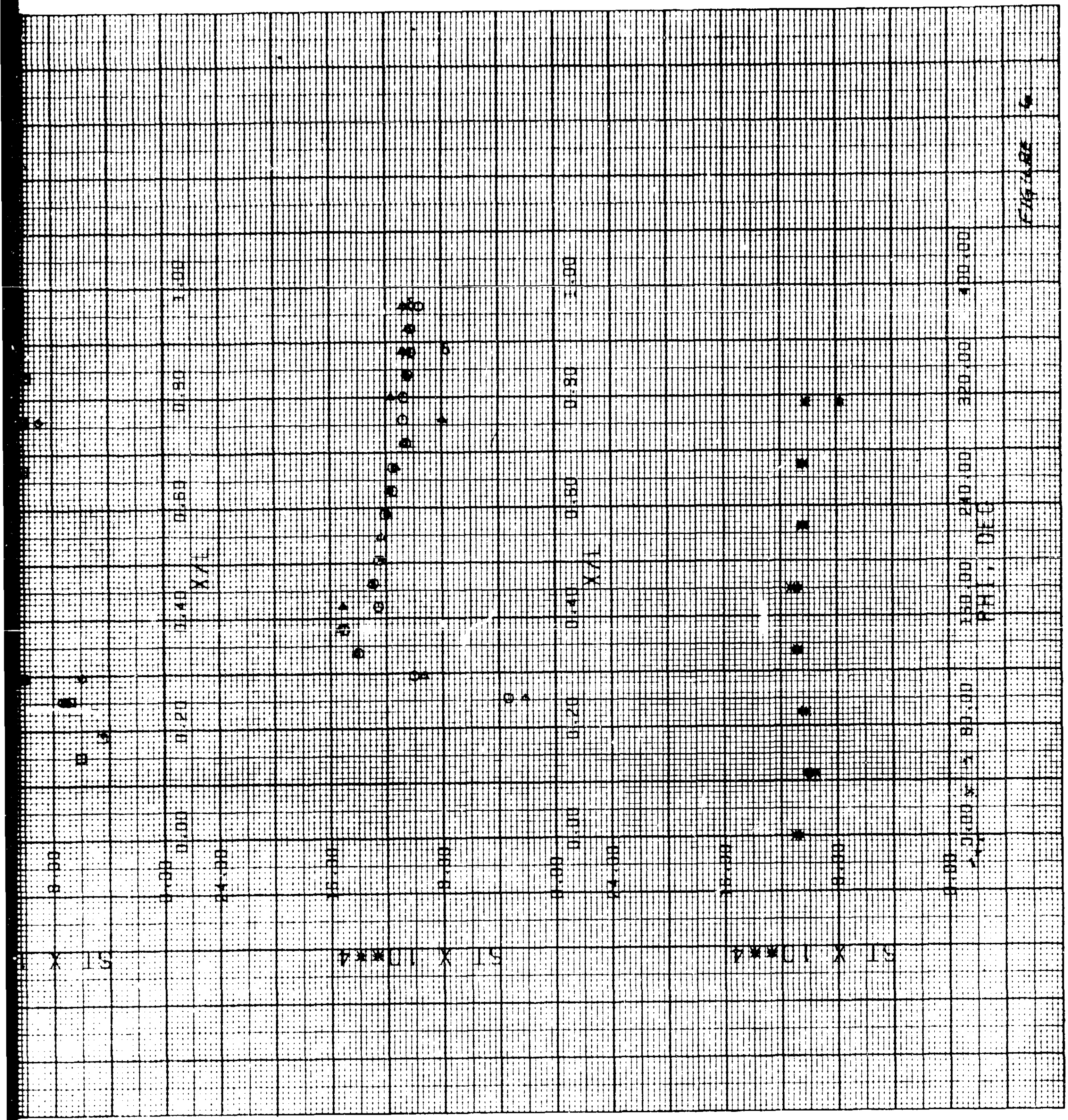


Figure 6
ST X
ST X 10**4
ST X 10**4
X/L
X/L
PHI, DEG
0.00
0.20
0.40
0.60
0.80
1.00
80.00
160.00
240.00
320.00
400.00
8.00
16.00
24.00

Figure 6

7/16/69

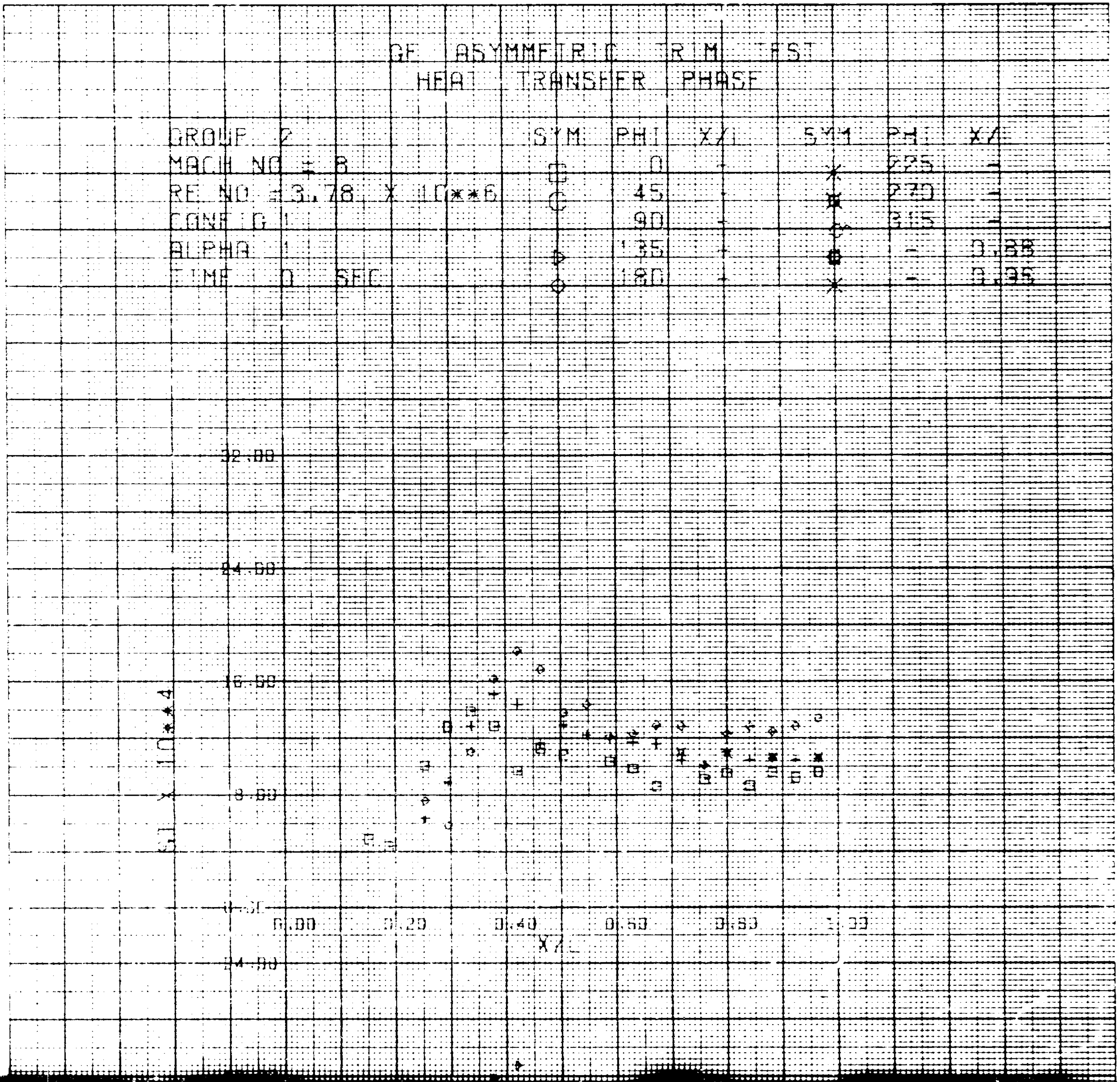
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
2	1	1.02	0	1.02	0	0	714	8.00	860.09	1337.09	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.68903E 01	8.81803E-02	3.95048E 00	3.85857E 03	7.63577E-05	7.80054E-08	3.77702E 06	3.46352E 06	3.27859E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOO	HT	HM	NU	ST
1	.1500	0	519.09	4.2825E 00	9.3093E-01	1.1380E-03	4.5749E-03	1.2452E 02	4.8298E-04
2	.1867	0	513.09	3.9373E 00	8.4272E-01	1.0227E-03	4.1150E-03	1.2309E 02	4.3410E-04
3	.2524	0	515.87	6.5824E 00	1.9458E 00	2.3694E-03	9.5343E-03	1.2376E 02	1.0058E-03
4	.2943	0	524.60	7.7805E 00	2.4554E 00	3.0225E-03	1.2157E-02	1.2584E 02	1.2826E-03
5	.3363	0	526.71	8.4139E 00	2.6557E 00	3.2771E-03	1.3179E-02	1.2634E 02	1.3902E-03
6	.3783	0	526.82	8.1671E 00	2.4550E 00	3.0299E-03	1.2185E-02	1.2637E 02	1.2854E-03
7	.4203	0	523.90	6.6007E 00	1.8598E 00	2.2870E-03	9.1988E-03	1.2567E 02	9.7039E-04
8	.4623	0	527.16	7.7812E 00	2.1440E 00	2.6471E-03	1.0645E-02	1.2645E 02	1.1230E-03
9	.5043	0	526.87	7.6388E 00	2.0666E 00	2.5507E-03	1.0258E-02	1.2638E 02	1.0821E-03
10	.5463	0	518.90	1.5131E-02	4.2455E-03	5.2662E-06	2.1173E-05	1.2734E 02	2.2338E-06
11	.5882	0	529.70	7.1311E 00	1.9644E 00	2.4336E-03	9.7852E-03	1.2705E 02	1.0322E-03
12	.6302	0	533.46	6.8808E 00	1.8615E 00	2.3164E-03	9.3121E-03	1.2794E 02	9.8234E-04
13	.6722	0	539.38	6.4459E 00	1.6148E 00	2.0243E-03	8.1353E-03	1.2935E 02	8.5820E-04
99	.8822	315.0	539.09	4.4410E 00	1.2611E 00	1.5803E-03	6.3510E-03	1.2929E 02	6.6998E-04
15	.7583	0	541.05	7.0716E 00	1.7006E 00	2.1363E-03	8.5845E-03	1.2975E 02	9.0559E-04
16	.7996	0	539.89	6.3580E 00	1.7841E 00	2.2380E-03	8.9936E-03	1.2947E 02	9.4874E-04
17	.8409	0	539.39	6.3420E 00	1.6204E 00	2.0314E-03	8.1637E-03	1.2936E 02	8.6120E-04
18	.8822	0	543.22	7.1 98E 00	1.7864E 00	2.2503E-03	9.0414E-03	1.3027E 02	9.5379E-04
19	.9235	0	544.61	6.8310E 00	1.7115E 00	2.1597E-03	8.6770E-03	1.3060E 02	9.1535E-04
20	.9648	0	545.70	7.4265E 00	1.7859E 00	2.2567E-03	9.0661E-03	1.3086E 02	9.5639E-04
21	.2524	45.0	513.18	5.2266E 00	1.5450E 00	1.8753E-03	7.5470E-03	1.2313E 02	7.9614E-04
22	.2943	45.0	521.74	6.6612E 00	2.0716E 00	2.5408E-03	1.0220E-02	1.2516E 02	1.0782E-03
23	.3363	45.0	525.56	8.9169E 00	2.6804E 00	3.3029E-03	1.3284E-02	1.2607E 02	1.4013E-03
24	.3783	45.0	527.08	8.9078E 00	2.6777E 00	3.3058E-03	1.3294E-02	1.2643E 02	1.4024E-03
25	.4203	45.0	526.06	7.5657E 00	2.1983E 00	2.7105E-03	1.0901E-02	1.2619E 02	1.1499E-03
26	.4623	45.0	529.49	8.0477E 00	2.2560E 00	2.7960E-03	1.1242E-02	1.2700E 02	1.1860E-03
27	.5043	45.0	531.94	8.2784E 00	2.1962E 00	2.7277E-03	1.0966E-02	1.2758E 02	1.1569E-03
100	.9648	315.0	548.77	7.2091E 00	1.7336E 00	2.1991E-03	8.8334E-03	1.3159E 02	9.3184E-04
29	.5882	45.0	533.87	7.6320E 00	2.1029E 00	2.6179E-03	1.0524E-02	1.2803E 02	1.1102E-03
30	.6302	45.0	537.76	7.4074E 00	2.0040E 00	2.5071E-03	1.0070E-02	1.2897E 02	1.0630E-03
31	.6722	45.0	545.05	9.0235E 00	1.9695E 00	2.4867E-03	9.9902E-03	1.3070E 02	1.0539E-03
32	.7170	45.0	547.44	7.7353E 00	1.8216E 00	2.3068E-03	9.2665E-03	1.3127E 02	9.7753E-04
33	.7583	45.0	544.90	6.6957E 00	1.8449E 00	2.3288E-03	9.3562E-03	1.3067E 02	9.8649E-04
34	.7996	45.0	544.46	6.5704E 00	1.8435E 00	2.3258E-03	9.3444E-03	1.3056E 02	9.8575E-04
35	.8409	45.0	546.30	6.5637E 00	1.7757E 00	2.2455E-03	9.0208E-03	1.3100E 02	9.5162E-04
36	.8822	45.0	548.28	6.7005E 00	1.7624E 00	2.2343E-03	8.9747E-03	1.3147E 02	9.4675E-04
37	.9235	45.0	549.96	6.7713E 00	1.7301E 00	2.1980E-03	8.8283E-03	1.3187E 02	9.3131E-04
38	.9648	45.0	550.13	6.7663E 00	1.6272E 00	2.0676E-03	8.3046E-03	1.3191E 02	8.7605E-04
39	.2524	90.0	516.03	4.1493E 00	1.2266E 00	1.4939E-03	6.0112E-03	1.2380E 02	6.3413E-04
40	.2943	90.0	523.65	5.3169E 00	1.7047E 00	2.0957E-03	8.4293E-03	1.2561E 02	8.8921E-04
41	.3363	90.0	527.17	7.7617E 00	2.4498E 00	3.0248E-03	1.2164E-02	1.2645E 02	1.2832E-03
42	.3783	90.0	529.14	9.1030E 00	2.8732E 00	3.5561E-03	1.4299E-02	1.2692E 02	1.5084E-03
43	.4203	90.0	530.58	9.2558E 00	2.7361E 00	3.3925E-03	1.3640E-02	1.2726E 02	1.4389E-03
44	.4623	90.0	527.89	7.1184E 00	2.2113E 00	2.7327E-03	1.0989E-02	1.2662E 02	1.1592E-03
45	.5043	90.0	531.93	8.9206E 00	2.4579E 00	3.0527E-03	1.2273E-02	1.2758E 02	1.2947E-03
46	.5463	90.0	534.29	9.1051E 00	2.3146E 00	2.8831E-03	1.1590E-02	1.2814E 02	1.2226E-03
47	.5882	90.0	534.73	8.0405E 00	2.2560E 00	2.8117E-03	1.1303E-02	1.2825E 02	1.1923E-03
48	.6302	90.0	538.10	8.0054E 00	2.2057E 00	2.7607E-03	1.1095E-02	1.2905E 02	1.1704E-03
49	.6722	90.0	545.46	8.6066E 00	2.1561E 00	2.7237E-03	1.0942E-02	1.3080E 02	1.1543E-03
50	.7170	90.0	548.24	8.2676E 00	1.9469E 00	2.4681E-03	9.9139E-03	1.3147E 02	1.0458E-03
51	.7583	90.0	543.82	7.2290E 00	1.8832E 00	2.3739E-03	9.5379E-03	1.3041E 02	1.0062E-03
52	.7996	90.0	544.27	7.9048E 00	2.0592E 00	2.5973E-03	1.0435E-02	1.3052E 02	1.1008E-03
53	.8409	90.0	545.27	7.8046E 00	1.9552E 00	2.4693E-03	9.9203E-03	1.3076E 02	1.0465E-03
54	.8822	90.0	547.78	8.0174E 00	1.9680E 00	2.4934E-03	1.0016E-02	1.3136E 02	1.0566E-03
55	.9235	90.0	548.55	8.0831E 00	1.9438E 00	2.4651E-03	9.9017E-03	1.3154E 02	1.0445E-03
56	.9648	90.0	547.21	8.1570E 00	1.9616E 00	2.4834E-03	9.9761E-03	1.3122E 02	1.0524E-03
57	.2524	135.0	509.51	1.3521E 00	3.9970E-01	4.8298E-04	1.9441E-03	1.2226E 02	2.0509E-04
58	.2943	135.0	518.23	5.5761E 00	1.7878E 00	2.1833E-03	8.7843E-03	1.2433E 02	9.2666E-04
59	.3363	135.0	520.60	7.5989E 00	2.3985E 00	2.9375E-03	1.1817E-02	1.2489E 02	1.2466E-03
60	.3783	135.0	522.24	9.9283E 00	3.0531E 00	3.7468E-03	1.5072E-02	1.2528E 02	1.5899E-03
61	.4203	135.0	522.43	1.0738E 01	3.2279E 00	3.9623E-03	1.5938E-02	1.2532E 02	1.6813E-03
62	.4623	135.0	522.57	9.6334E 00	2.7991E 00	3.4365E-03	1.3823E-02	1.2536E 02	1.4582E-03
63	.5043	135.0	524.99	1.0259E 01	2.6212E 00	3.2277E-03	1.2982E-02	1.2593E 02	1.3694E-03
64	.5463	135.0	525.67	9.9758E 00	2.6225E 00	3.2320E-03	1.2998E-02	1.2609E 02	1.3712E-03
65	.5882	135.0	528.21	9.4213E 00	2.5018E 00	3.0930E-03	1.2437E-02	1.2670E 02	1.3120E-03
66	.6302	135.0	530.22	9.3318E 00	2.4780E 00	3.0712E-03	1.2349E-02	1.2717E 02	1.3027E-03
67	.6722	135.0	540.63	9.7649E 00	2.3483E 00	2.9484E-03	1.1848E-02	1.2965E 02	1.2499E-03
68	.7170	135.0	542.61	9.2683E 00	2.1826E 00	2.7472E-03	1.1038E-02	1.3012E 02	1.1645E-03
69	.7583	135.0	533.83	5.7885E 00	1.6241E 00	2.0219E-03	8.1282E-03	1.2803E 02	8.5745E-04
70	.7996	135.0	537.19	8.3103E 00	2.4146E 00	3.0187E-03	1.2133E-02	1.2883E 02	1.2799E-03
71	.8409	135.0	537.81	8.1277E 00	2.2394E 00	2.8018E-03	1.1261E-02	1.2898E 02	1.1879E-03
72	.8822	135.0	539.66	8.4418E 00	2.2838E 00	2.8640E-03	1.1510E-02	1.2942E 02	1.2142E-03
73	.9235	135.0	541.24	8.7575E 00	2.1497E 00	2.7012E-03	1.0854E-02	1.2980E 02	1.1450E-03
74	.9648	135.0	545.45	9.4350E 00	2.2689E 00	2.8661E-03	1.1514E-02	1.3080E 02	1.2147E-03
75	.2524	180.0	510.86	5.0484E 00	1.4668E 00	1.7754E-03	7.1458E-03	1.2258E 02	7.5382E-04
76	.2943	180.0	517.61	3.4894E 00	1.1198E 00	1.3652E-03	5.4931E-03	1.2418E 02	5.7947E-04
77	.3363	180.0	522.04	7.1463E 00	2.1125E 00	2.5920E-03	1.0426E-02	1.2524E 02	1.0999E-03
78	.3783	180.0	525.03	1.0308E 01	3.0985E 00	3.8156E-03	1.5346E-02	1.2594E 02	1.6189E-03
79	.4203	180.0	526.64	1.1709E 01	3.4612E 00	4.2709E-03	1.7176E-02	1.2633E 02	1.8119E-03
80	.4623	180.0	528.07	1.1266E 01	3.2172E 00	3.9767E-03	1.5991E-02	1.2666E 02	1.6869E-03
81	.5043	180.0	528.64	1.0474E 01	2.6239E 00	3.2456E-03	1.3051E-02	1.2680E 02	1.3768E-03
82	.5463	180.0	529.37	1.0310E 01	2.7379E 00	3.3897E-03	1.3630E-02	1.2697E 02	1.4378E-03
83	.5882	180.0	529.47	9.6617E 00	2.3001E 00	2.8480E-03	1.1452E-02	1.2700E 02	1.2081E-03
84	.6302	180.0	534.49	8.7576E 00	2.3256E 00	2.8976E-03	1.1648E-02	1.2819E 02	1.2287E-03
85	.6722	180.0	546.17	1.0002E 01	2.4052E 00	3.0410E-03	1.2217E-02	1.3097E 02	1.2888E-03
86	.7170	180.0	548.96	1.0131E 01	2.3858E 00	3.0272E-03	1.2159E-02	1.3164E 02	1.2827E-03
87	.7583	180.0	539.42	7.8493E 00	1.8876E 00	2.3664E-03	9.5100E-03	1.2936E 02	1.0032E-03
88	.7996	180.0	542.38	8.8367E 00	2.3020E 00	2.8965E-03	1.1639E-02	1.3006E 02	1.2278E-03
89	.8409	180.0	543.28	9.4025E 00	2.4024E 00	3.0264E-03	1.2160E-02	1.3028E 02	1.2827E-03
90	.8822	180.0	545.37	1.0096E 01	2.3266E 00	2.9387E-03	1.1806E-02	1.3078E 02	1.2455E-03
91	.9235	180.0	546.77	9.7368E 00	2.3901E 00	3.0242E-03	1.2149E-02	1.3111E 02	1.2816E-03
92	.9648	180.0	550.54	1.0773E 01	2.4825E 00	3.1562E-03	1.2676E-02	1.3201E 02	1.3372E-03
93	.8822	225.0	545.67	8.5477E 00	2.1840E 00	2.7596E-03	1.1047E-02	1.3085E 02	1.1695E-03
94	.9648	225.0	550.28	9.1319E 00	2.1960E 00	2.7911E-03	1.1210E-02	1.3195E 02	1.1826E-03
95	.7170	270.0	551.28	9.0353E 00	2.0370E 00	2.5920E-03	1.0410E-02	1.3217E 02	1.0981E-03
96	.7996	270.0	546.54	7.6434E 00	2.0297E 00	2.5675E-03	1.0314E-02	1.3106E 02	1.0880E-03
97	.8822	270.0	548.51	7.7595E 00	1.9826E 00	2.5142E-03	1.0049E-02	1.3153E 02	1.0653E-03
98	.9648	270.0	550.67	8.2012E 00	[illegible]722E 00	2.5079E-03	1.0072E-02	1.3204E 02	1.0625E-03

GF ASYMMETRIC RIM HST
HEAT TRANSFER PHASE
GROUP 2 ISYM. PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 2
MACH NO = 8
RE NO = 3.78 X 10**6
CONFIG 1
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.95
32.00
24.00
16.00
8.00
0.00
-8.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

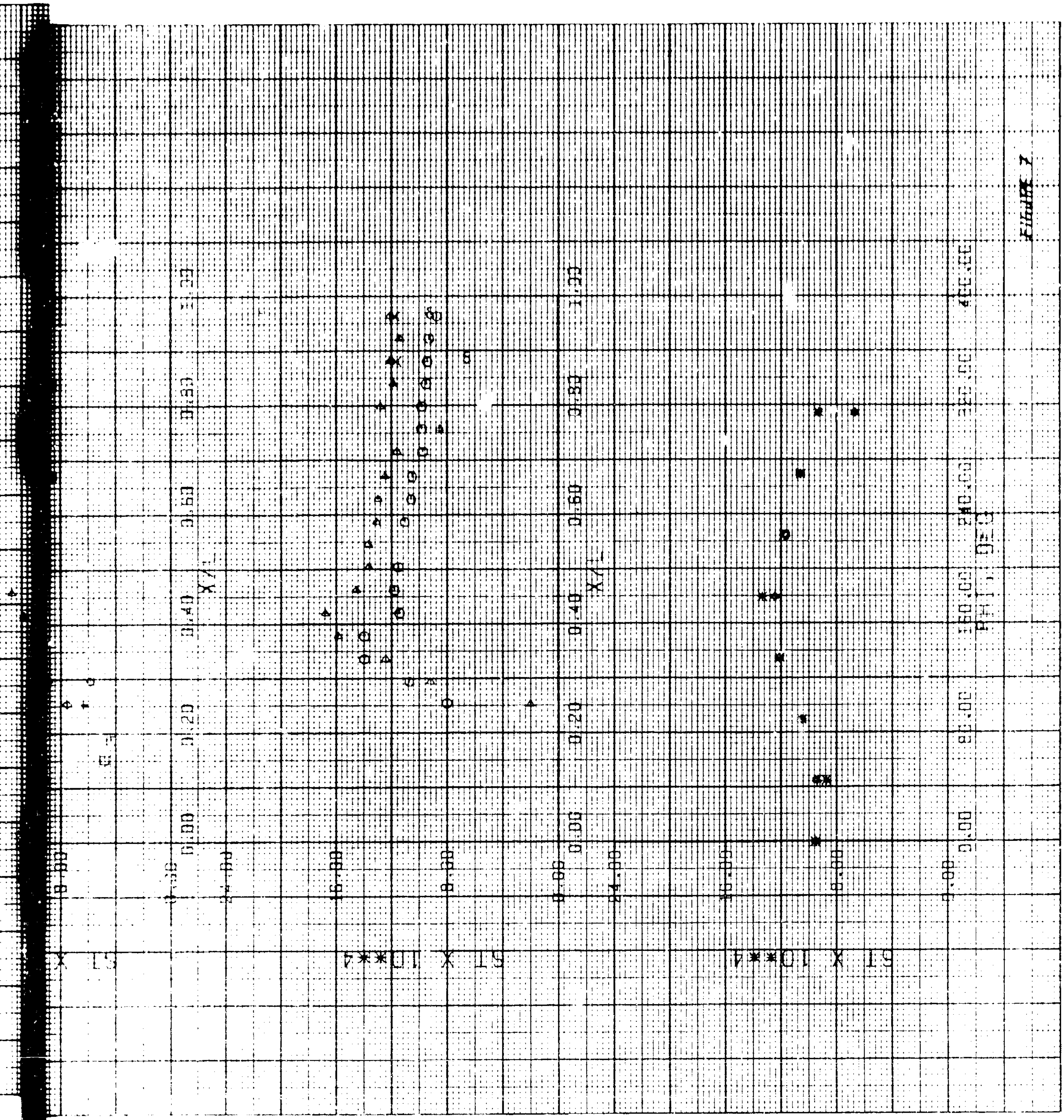


FIGURE 7
ST X 10**4
X/L
PHI, DEG
0.00
0.20
0.40
0.60
0.80
1.00
8.00
16.00
24.00
0.00
80.00
160.00
240.00
320.00
400.00

Figure 7

3

7/16/69

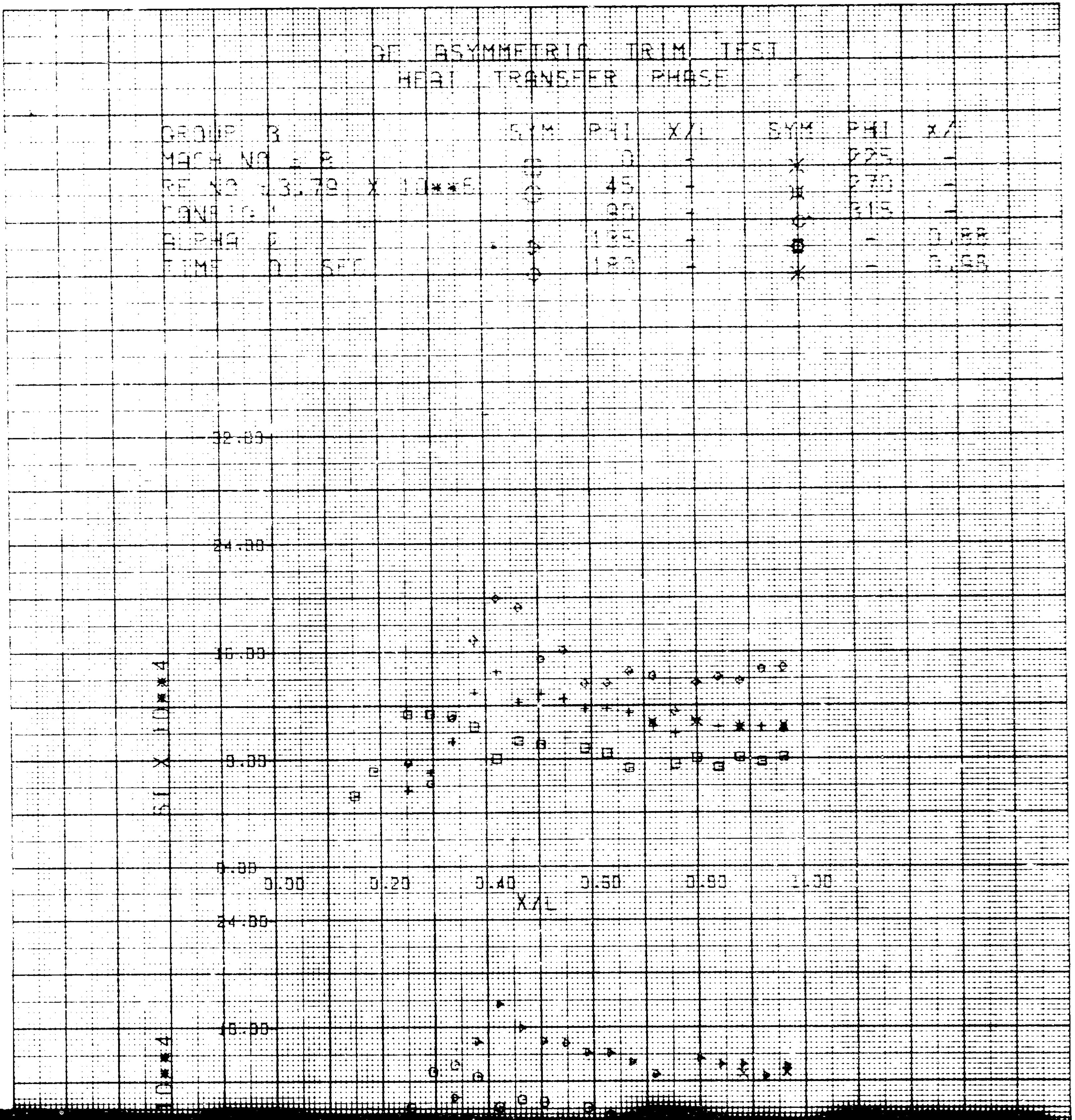
ARO, INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
3	1	2.06	-.06	2.06	.02	0	714	8.00	860.49	1332.06	.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.0586E 01	8.8139E-02	3.9446E 00	3.8524E 03	7.5504E-05	7.7590E-08	3.7912E 06	3.4775E 06	3.2675E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDR	HT	HM	HW	ST
1	.1500	0	510.30	4.7030E 00	1.0223E 00	1.2992E-03	5.0513E-03	1.2436E 02	5.3227E-04
2	.1847	0	515.96	6.2455E 00	1.3716E 00	1.6780E-03	6.7517E-03	1.2366E 02	7.1166E-04
3	.2524	0	521.09	7.3762E 00	2.1005E 00	2.6881E-03	1.0818E-02	1.2519E 02	1.1399E-03
4	.2943	0	529.29	6.8534E 00	2.1632E 00	2.6916E-03	1.0826E-02	1.2694E 02	1.1408E-03
5	.3363	0	530.42	6.7950E 00	2.1447E 00	2.6727E-03	1.0749E-02	1.2722E 02	1.1326E-03
6	.3783	0	532.39	6.9466E 00	1.9680E 00	2.4586E-03	9.4859E-03	1.2769E 02	1.0418E-03
7	.4203	0	530.08	5.2567E 00	1.5274E 00	1.9040E-03	7.6572E-03	1.2728E 02	8.0687E-04
8	.4623	0	534.08	6.4311E 00	1.7720E 00	2.2181E-03	8.9148E-03	1.2907E 02	9.3980E-04
9	.5043	0	534.64	6.1563E 00	1.7190E 00	2.1544E-03	8.6522E-03	1.2823E 02	9.1277E-04
10	.5463	0	529.31	1.6628E-01	4.6094E-02	5.7355E-05	2.3071E-04	1.2696E 02	2.4311E-05
11	.5882	0	538.76	6.0246E 00	1.6594E 00	2.0903E-03	8.4027E-03	1.2920E 02	8.8541E-04
12	.6302	0	541.28	5.8247E 00	1.5758E 00	1.9907E-03	8.0013E-03	1.2981E 02	8.4313E-04
13	.6722	0	543.57	5.4729E 00	1.3711E 00	1.7371E-03	6.9809E-03	1.3035E 02	7.3560E-04
99	.8822	315.0	547.73	4.3435E 00	1.1315E 00	1.4411E-03	5.7903E-03	1.3136E 02	6.1014E-04
15	.7583	0	547.39	5.4093E 00	1.4211E 00	1.8092E-03	7.2693E-03	1.3126E 02	7.6599E-04
16	.7996	0	548.32	5.1340E 00	1.4966E 00	1.9076E-03	7.0664E-03	1.3149E 02	8.0762E-04
17	.8409	0	548.14	5.1863E 00	1.3763E 00	1.7538E-03	7.0465E-03	1.3144E 02	7.4251E-04
18	.8822	0	551.29	5.9845E 00	1.4992E 00	1.9183E-03	7.7058E-03	1.3219E 02	8.1199E-04
19	.9235	0	551.86	5.7481E 00	1.4400E 00	1.8438E-03	7.4066E-03	1.3233E 02	7.8046E-04
20	.9648	0	552.34	6.2559E 00	1.5044E 00	1.9275E-03	7.7434E-03	1.3244E 02	8.1584E-04
21	.2524	45.0	515.94	6.5651E 00	1.9407E 00	2.3785E-03	9.5726E-03	1.2402E 02	1.0087E-03
22	.2943	45.0	525.39	7.5689E 00	2.4267E 00	3.0054E-03	1.2090E-02	1.2603E 02	1.2739E-03
23	.3363	45.0	527.87	8.1536E 00	2.5111E 00	3.1194E-03	1.2547E-02	1.2662E 02	1.3221E-03
24	.3783	45.0	530.51	7.8016E 00	2.3452E 00	2.9229E-03	1.1755E-02	1.2724E 02	1.2386E-03
25	.4203	45.0	530.10	6.4077E 00	1.9198E 00	2.3915E-03	9.6179E-03	1.2715E 02	1.0135E-03
26	.4623	45.0	534.18	7.1928E 00	2.0069E 00	2.5128E-03	1.0109E-02	1.2812E 02	1.0647E-03
27	.5043	45.0	537.22	7.4122E 00	1.9683E 00	2.4739E-03	9.9653E-03	1.2884E 02	1.0480E-03
100	.9648	315.0	557.09	6.3243E 00	1.5209E 00	1.9605E-03	7.8729E-03	1.3357E 02	8.2959E-04
29	.5882	45.0	539.90	6.8666E 00	1.8920E 00	2.3860E-03	9.5905E-03	1.2948E 02	1.0106E-03
30	.6302	45.0	542.89	6.5578E 00	1.7741E 00	2.2458E-03	9.0259E-03	1.3019E 02	9.5108E-04
31	.6722	45.0	547.67	7.0760E 00	1.7369E 00	2.2121E-03	8.8841E-03	1.3133E 02	9.3657E-04
32	.7170	45.0	549.84	6.8999E 00	1.6249E 00	2.0751E-03	8.3366E-03	1.3185E 02	8.7845E-04
33	.7583	45.0	548.95	6.0415E 00	1.6669E 00	2.1235E-03	8.5313E-03	1.3163E 02	8.9897E-04
34	.7996	45.0	549.49	5.8740E 00	1.6481E 00	2.1039E-03	8.4524E-03	1.3176E 02	8.9065E-04
35	.8409	45.0	551.49	5.9229E 00	1.6024E 00	2.0507E-03	8.2379E-03	1.3224E 02	8.6805E-04
36	.8822	45.0	553.01	5.9654E 00	1.5690E 00	2.0120E-03	8.0816E-03	1.3260E 02	8.5158E-04
37	.9235	45.0	554.07	5.0607E 00	1.5486E 00	1.9884E-03	7.9866E-03	1.3285E 02	8.4157E-04
38	.9648	45.0	554.98	6.1555E 00	1.4803E 00	1.9030E-03	7.6429E-03	1.3307E 02	8.0535E-04
39	.2524	90.0	516.82	3.7324E 00	1.1033E 00	1.3521E-03	5.4415E-03	1.2399E 02	5.7339E-04
40	.2943	90.0	524.09	4.1851E 00	1.3418E 00	1.6591E-03	6.6746E-03	1.2572E 02	7.0332E-04
41	.3363	90.0	527.24	5.6544E 00	1.7867E 00	2.2153E-03	8.9107E-03	1.2647E 02	9.3895E-04
42	.3783	90.0	530.21	7.7710E 00	2.4528E 00	3.0559E-03	1.2290E-02	1.2717E 02	1.2950E-03
43	.4203	90.0	533.59	9.3032E 00	2.7501E 00	3.4408E-03	1.3835E-02	1.2797E 02	1.4579E-03
44	.4623	90.0	532.17	7.4406E 00	2.3113E 00	2.9865E-03	1.1607E-02	1.2763E 02	1.2231E-03
45	.5043	90.0	537.13	8.7647E 00	2.4199E 00	3.0349E-03	1.2201E-02	1.2892E 02	1.2856E-03
46	.5463	90.0	538.33	8.2195E 00	2.3472E 00	2.9543E-03	1.1876E-02	1.2910E 02	1.2514E-03
47	.5882	90.0	540.43	7.1683E 00	2.2077E 00	2.7860E-03	1.1198E-02	1.2960E 02	1.1800E-03
48	.6302	90.0	543.11	7.9852E 00	2.2002E 00	2.7859E-03	1.1196E-02	1.3024E 02	1.1798E-03
49	.6722	90.0	547.70	8.5053E 00	2.1307E 00	2.7137E-03	1.0903E-02	1.3134E 02	1.1489E-03
50	.7170	90.0	550.64	8.1600E 00	1.9216E 00	2.4567E-03	9.8690E-03	1.3204E 02	1.0399E-03
51	.7583	90.0	547.05	7.0612E 00	1.8394E 00	2.3408E-03	9.4054E-03	1.3118E 02	9.9107E-04
52	.7996	90.0	548.35	7.7788E 00	2.0264E 00	2.5830E-03	1.0378E-02	1.3149E 02	1.0935E-03
53	.8409	90.0	549.08	7.6568E 00	1.9182E 00	2.4473E-03	9.8324E-03	1.3166E 02	1.0361E-03
54	.8822	90.0	550.90	7.8191E 00	1.9194E 00	2.4548E-03	9.8615E-03	1.3212E 02	1.0391E-03
55	.9235	90.0	551.90	7.8592E 00	1.9140E 00	2.4509E-03	9.8450E-03	1.3234E 02	1.0374E-03
56	.9648	90.0	552.43	7.8398E 00	1.8853E 00	2.4157E-03	9.7036E-03	1.3246E 02	1.0225E-03
57	.2524	135.0	509.66	1.3602E 00	4.0209E-01	4.8845E-04	1.9666E-03	1.2229E 02	2.0722E-04
58	.2943	135.0	518.25	5.1896E 00	1.7280E 00	2.1213E-03	8.5367E-03	1.2433E 02	8.9953E-04
59	.3363	135.0	520.71	6.5556E 00	2.0691E 00	2.5479E-03	1.0252E-02	1.2493E 02	1.0803E-03
60	.3783	135.0	524.24	9.1833E 00	2.8527E 00	3.5279E-03	1.4193E-02	1.2575E 02	1.4955E-03
61	.4203	135.0	526.87	1.1229E 01	3.3755E 00	4.1881E-03	1.6846E-02	1.2638E 02	1.7751E-03
62	.4623	135.0	529.28	1.0459E 01	3.0389E 00	3.7771E-03	1.5192E-02	1.2671E 02	1.6008E-03
63	.5043	135.0	531.51	1.1119E 01	2.8409E 00	3.5452E-03	1.4257E-02	1.2748E 02	1.5023E-03
64	.5463	135.0	532.89	1.0558E 01	2.8036E 00	3.5047E-03	1.4093E-02	1.2781E 02	1.4850E-03
65	.5882	135.0	535.59	1.0038E 01	2.6655E 00	3.3433E-03	1.3442E-02	1.2945E 02	1.4164E-03
66	.6302	135.0	536.88	9.9867E 00	2.6520E 00	3.3317E-03	1.3394E-02	1.2876E 02	1.4114E-03
67	.6722	135.0	544.81	1.0419E 01	2.5055E 00	3.1794E-03	1.2777E-02	1.3065E 02	1.3463E-03
68	.7170	135.0	546.40	9.8743E 00	2.3253E 00	2.9567E-03	1.1880E-02	1.3103E 02	1.2519E-03
69	.7583	135.0	538.33	6.4514E 00	1.8101E 00	2.2783E-03	9.1544E-03	1.2911E 02	9.6505E-04
70	.7996	135.0	543.42	8.8198E 00	2.5627E 00	3.2462E-03	1.3046E-02	1.3032E 02	1.3747E-03
71	.8409	135.0	544.41	8.9577E 00	2.4681E 00	3.1303E-03	1.2580E-02	1.3055E 02	1.3255E-03
72	.8822	135.0	545.70	9.0923E 00	2.4598E 00	3.1249E-03	1.2557E-02	1.3086E 02	1.3232E-03
73	.9235	135.0	547.87	9.3492E 00	2.2949E 00	2.9233E-03	1.1748E-02	1.3136E 02	1.2377E-03
74	.9648	135.0	550.87	1.0081E 01	2.4243E 00	3.1002E-03	1.2454E-02	1.3209E 02	1.3123E-03
75	.2524	180.0	513.88	5.1590E 00	1.4990E 00	1.8303E-03	7.3675E-03	1.2329E 02	7.7634E-04
76	.2943	180.0	518.87	3.7166E 00	1.1916E 00	1.4639E-03	5.8910E-03	1.2448E 02	6.2075E-04
77	.3363	180.0	523.64	7.1490E 00	2.1133E 00	2.6116E-03	1.0507E-02	1.2561E 02	1.1071E-03
78	.3783	180.0	528.43	1.0666E 01	3.2062E 00	3.9857E-03	1.6031E-02	1.2675E 02	1.6892E-03
79	.4203	180.0	533.06	1.2783E 01	3.7788E 00	4.7247E-03	1.8998E-02	1.2785E 02	2.0019E-03
80	.4623	180.0	535.75	1.2714E 01	3.6307E 00	4.5549E-03	1.8313E-02	1.2849E 02	1.9297E-03
81	.5043	180.0	536.93	1.1577E 01	2.9002E 00	3.6438E-03	1.4649E-02	1.2877E 02	1.5436E-03
82	.5463	180.0	538.29	1.1393E 01	3.0254E 00	3.8076E-03	1.5306E-02	1.2909E 02	1.6129E-03
83	.5882	180.0	538.85	9.4357E 00	2.5588E 00	3.2226E-03	1.2954E-02	1.2923E 02	1.3650E-03
84	.6302	180.0	542.97	9.4268E 00	2.5564E 00	3.2364E-03	1.3007E-02	1.3021E 02	1.3706E-03
85	.6722	180.0	551.57	1.1147E 01	2.6805E 00	3.4310E-03	1.3792E-02	1.3226E 02	1.4523E-03
86	.7170	180.0	554.47	1.1093E 01	2.6123E 00	3.3561E-03	1.3479E-02	1.3295E 02	1.4204E-03
87	.7583	180.0	546.11	8.9406E 00	2.1500E 00	2.7328E-03	1.0981E-02	1.3096E 02	1.1571E-03
88	.7996	180.0	550.44	9.7500E 00	2.5399E 00	3.2462E-03	1.3041E-02	1.3199E 02	1.3742E-03
89	.8409	180.0	551.82	1.0199E 01	2.6059E 00	3.3364E-03	1.3402E-02	1.3232E 02	1.4122E-03
90	.8822	180.0	553.51	1.1055E 01	2.5470E 00	3.2691E-03	1.3131E-02	1.3272E 02	1.3836E-03
91	.9235	180.0	554.30	1.1020E 01	2.7051E 00	3.4743E-03	1.3955E-02	1.3291E 02	1.4705E-03
92	.9648	180.0	554.55	1.1758E 01	2.7095E 00	3.4988E-03	1.4049E-02	1.3390E 02	1.4804E-03
93	.8822	225.0	555.29	9.0502E 00	2.3124E 00	2.9739E-03	1.1944E-02	1.3314E 02	1.2586E-03
94	.9648	225.0	558.69	9.6296E 00	2.3157E 00	2.9912E-03	1.2011E-02	1.3396E 02	1.2657E-03
95	.7170	270.0	556.65	8.7688E 00	1.9769E 00	2.5459E-03	1.0228E-02	1.3347E 02	1.0778E-03
96	.7996	270.0	557.80	7.4454E 00	1.9771E 00	2.5509E-03	1.0244E-02	1.3374E 02	1.0794E-03
97	.8822	270.0	558.31	7.4321E 00	1.8990E 00	2.4517E-03	9.8453E-03	1.3381E 02	1.0374E-03
98	.9648	270.0	559.15	7.9602E 00	1.9143E 00	2.4741E-03	9.9360E-03	1.3406E 02	1.0468E-03

RE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
CONFIG 3 SYM PHI X/L SYM PHI X/


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP B
MACH NO = 8
RE NO =3.79 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.98
32.00
24.00
16.00
8.00
0.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
ST X 10**4

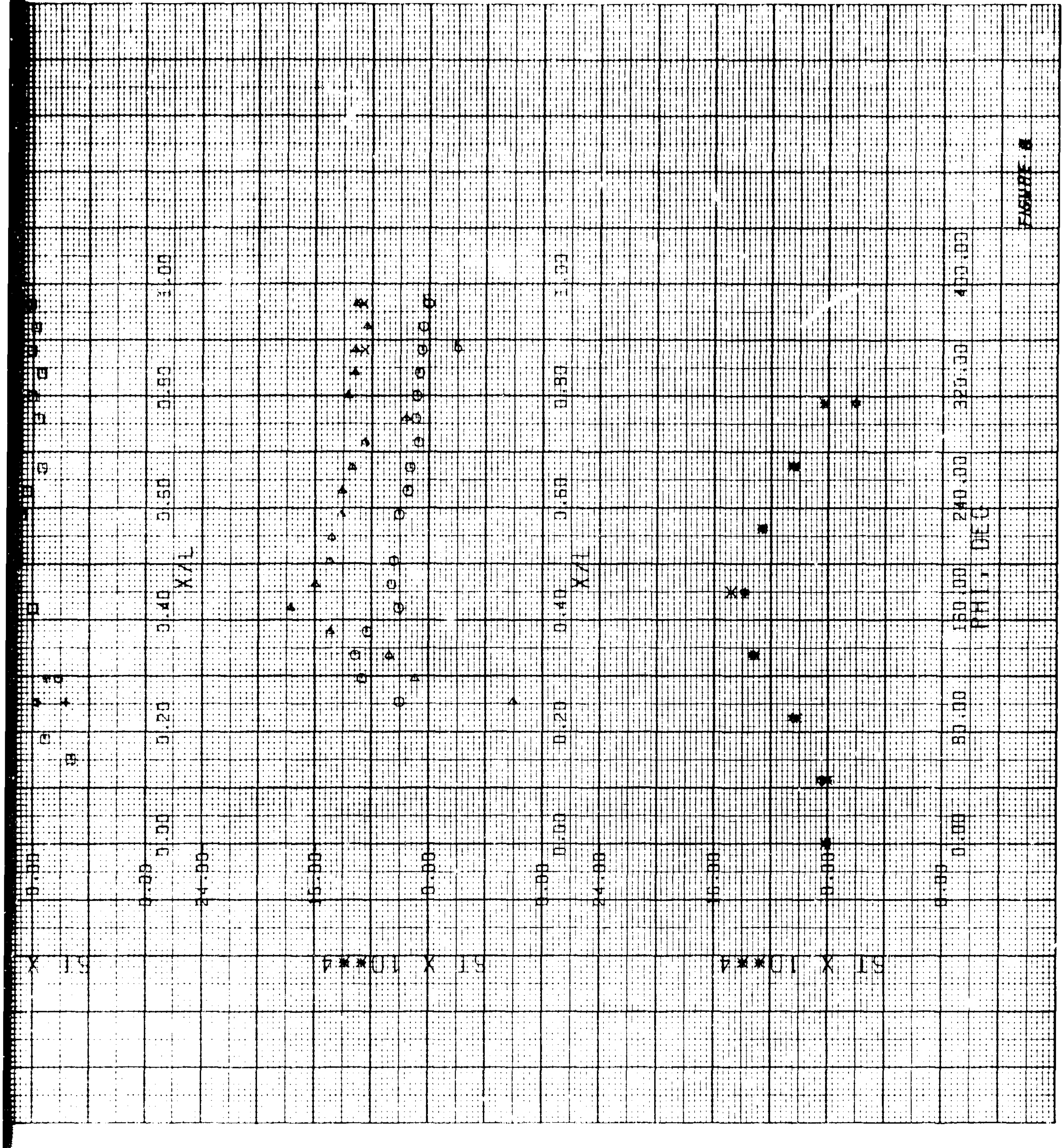
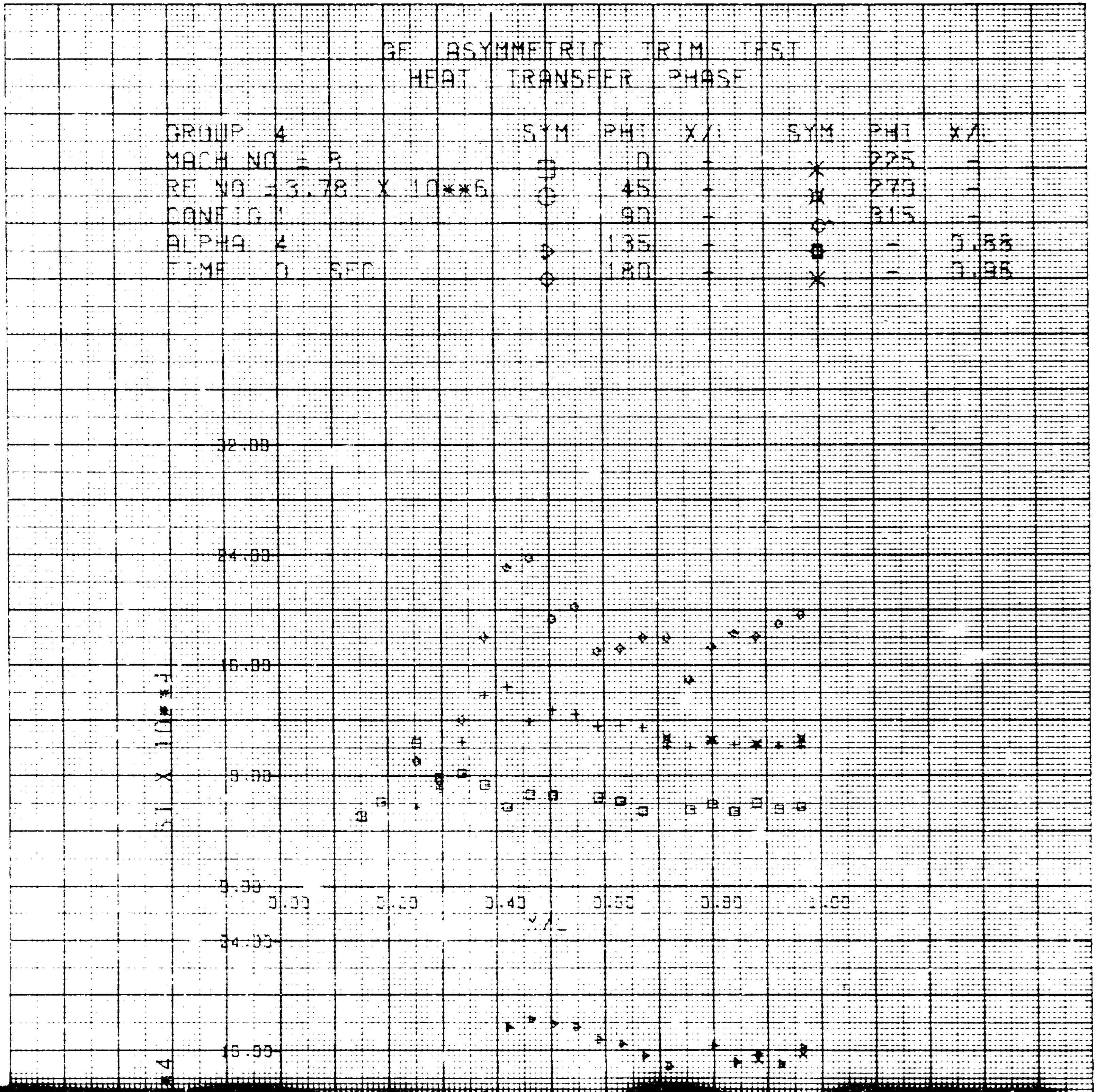
FIGURE 8
X/L
X/L
PHI, DEG
0.00
0.20
0.40
0.60
0.80
1.00
0.00
80.00
160.00
240.00
320.00
400.00
0.00
8.00
16.00
24.00
ST X 10**4
ST X 10**4
ST X 10**4

Figure 8

```
                                        7/14/69

                          AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                           VON KARMAN GAS DYNAMICS FACILITY
                             50 INCH HYPERSONIC TUNNEL B
                                      VT0967-800
GROUP   CONFIG    ALPHA-M      BETA-M        ALPHA-S      ROLL   ALP-P   DATE      MACH NO         PO          TO           TIME
  4        I        4.88         0             4.95          0      0     714        8.00          866.29     1336.33         .08
   T-INF         P-INF         Q-INF          V-INF        RHO-INF        MU-INF        RE/FT         RE/D          HO
 9.60352E 01  8.81187E-02  3.94777E 00  3.85747E 03  7.63479E-05  7.79620E-08  3.77761E 06  3.46542E 06  3.27696E 02

TC NO   X/L     PHI     TEMP     SLOPE         Q-STDN        HT           HM        [illegible]       ST

  1    .1900     0     500.71   4.5700E 00   9.9395E-01   1.2085E-03   4.0370E-03   1.2207E 02   5.1082E-04
  2    .1867     0     503.98   5.5139E 00   1.2109E 00   1.4540E-03   5.8542E-03   1.2096E 02   6.1424E-04
  3    .2524     0     506.49   6.8724E 00   2.0116E 00   2.4401E-03   9.8565E-03   1.2154E 02   1.0902E-03
  4    .2943     0     516.62   4.9315E 00   1.5250E 00   1.8604E-03   7.4860E-03   1.2394E 02   7.9003E-04
  5    .3363     0     519.78   4.9922E 00   1.5757E 00   1.9297E-03   7.7637E-03   1.2469E 02   8.1934E-04
  6    .3783     0     521.37   4.7000E 00   1.4128E 00   1.7336E-03   6.9741E-03   1.2507E 02   7.3601E-04
  7    .4203     0     521.04   3.4095E 00   1.1069E 00   1.3577E-03   5.4618E-03   1.2490E 02   5.7641E-04
  8    .4623     0     524.19   4.6550E 00   1.2826E 00   1.5791E-03   6.3522E-03   1.2574E 02   6.7038E-04
  9    .5043     0     524.91   4.6051E 00   1.2675E 00   1.5621E-03   6.2829E-03   1.2591E 02   6.6306E-04
 10    .5463     0     529.43  -1.9804E-02  -5.5567E-03  -6.8865E-06  -2.7691E-05   1.2699E 02  -2.9224E-06
 11    .5882     0     528.97   4.4715E 00   1.2320E 00   1.5260E-03   6.1363E-03   1.2688E 02   6.4760E-04
 12    .6302     0     532.22   4.1436E 00   1.1751E 00   1.4614E-03   5.8756E-03   1.2765E 02   6.2008E-04
 13    .6722     0     537.57   4.0930E 00   1.0254E 00   1.2837E-03   5.1507E-03   1.2892E 02   5.4452E-04
 14    .8022   315.0   540.51   3.5964E 00   9.3686E-01   1.1773E-03   4.7310E-03   1.2963E 02   4.9929E-04
 15    .7583     0     539.21   4.3184E 00   1.0385E 00   1.3028E-03   5.2359E-03   1.2931E 02   5.5257E-04
 16    .7996     0     539.15   3.9931E 00   1.1204E 00   1.4054E-03   5.6481E-03   1.2929E 02   5.9607E-04
 17    .8409     0     538.07   3.9692E 00   1.0139E 00   1.2714E-03   5.1099E-03   1.2923E 02   5.3927E-04
 18    .8822     0     541.83   4.5157E 00   1.1312E 00   1.4238E-03   5.7213E-03   1.2994E 02   6.0380E-04
 19    .9235     0     543.06   4.1607E 00   1.0423E 00   1.3140E-03   5.2708E-03   1.3023E 02   5.5720E-04
 20    .9648     0     544.39   4.4959E 00   1.0812E 00   1.3652E-03   5.4853E-03   1.3055E 02   5.7889E-04
 21    .2524    45.0   501.26   2.8742E 00   8.4965E-01   1.0175E-03   4.0976E-03   1.2030E 02   4.3244E-04
 22    .2943    45.0   511.60   4.2530E 00   1.3636E 00   1.6534E-03   6.6550E-03   1.2275E 02   7.0233E-04
 23    .3363    45.0   516.56   7.4178E 00   2.2298E 00   2.7200E-03   1.0945E-02   1.2393E 02   1.1551E-03
 24    .3783    45.0   518.82   7.3355E 00   2.2051E 00   2.6973E-03   1.0852E-02   1.2447E 02   1.1453E-03
 25    .4203    45.0   519.39   5.9503E 00   1.7289E 00   2.1163E-03   8.5147E-03   1.2460E 02   8.9859E-04
 26    .4623    45.0   523.35   6.1745E 00   1.7324E 00   2.1310E-03   8.5717E-03   1.2554E 02   9.0461E-04
 27    .5043    45.0   525.89   6.2880E 00   1.6698E 00   2.0604E-03   8.2845E-03   1.2615E 02   8.7451E-04
100    .9648   315.0   549.99   5.1633E 00   1.2417E 00   1.5791E-03   6.3475E-03   1.3188E 02   6.6935E-04
 29    .5882    45.0   529.22   5.7700E 00   1.5898E 00   1.9698E-03   7.9267E-03   1.2694E 02   8.3591E-04
 30    .6302    45.0   533.07   5.5561E 00   1.5031E 00   1.8713E-03   7.5232E-03   1.2785E 02   7.9396E-04
 31    .6722    45.0   540.94   5.9855E 00   1.4693E 00   1.8472E-03   7.4233E-03   1.2973E 02   7.8341E-04
 32    .7170    45.0   543.34   5.7370E 00   1.3510E 00   1.7037E-03   6.8456E-03   1.3030E 02   7.2245E-04
 33    .7583    45.0   540.51   5.0301E 00   1.3859E 00   1.7415E-03   6.9987E-03   1.2962E 02   7.3861E-04
 34    .7996    45.0   540.27   4.9014E 00   1.3752E 00   1.7275E-03   6.9422E-03   1.2955E 02   7.3264E-04
 35    .8409    45.0   542.06   4.9263E 00   1.3328E 00   1.6780E-03   6.7427E-03   1.2999E 02   7.1158E-04
 36    .8822    45.0   543.91   4.8472E 00   1.2749E 00   1.6089E-03   6.4645E-03   1.3043E 02   6.8223E-04
 37    .9235    45.0   545.92   4.8887E 00   1.2491E 00   1.5804E-03   6.3491E-03   1.3091E 02   6.7005E-04
 38    .9648    45.0   547.46   5.0008E 00   1.2024E 00   1.5242E-03   6.1231E-03   1.3128E 02   6.4620E-04
 39    .2524    90.0   502.91   3.8296E 00   1.1321E 00   1.3583E-03   5.4699E-03   1.2069E 02   5.7727E-04
 40    .2943    90.0   510.55   4.2092E 00   1.3752E 00   1.6654E-03   6.7035E-03   1.2250E 02   7.0745E-04
 41    .3363    90.0   515.88   6.4177E 00   2.0256E 00   2.4663E-03   9.9250E-03   1.2356E 02   1.0476E-03
 42    .3783    90.0   519.26   8.4553E 00   2.6688E 00   3.2663E-03   1.3141E-02   1.2457E 02   1.3869E-03
 43    .4203    90.0   522.78   9.3961E 00   2.7776E 00   3.4142E-03   1.3734E-02   1.2541E 02   1.4494E-03
 44    .4623    90.0   521.22   7.3915E 00   2.2961E 00   2.8169E-03   1.1332E-02   1.2503E 02   1.1959E-03
 45    .5043    90.0   526.24   8.9723E 00   2.4446E 00   3.0177E-03   1.2137E-02   1.2623E 02   1.2808E-03
 46    .5463    90.0   529.27   8.1296E 00   2.3787E 00   2.9474E-03   1.1852E-02   1.2695E 02   1.2508E-03
 47    .5882    90.0   529.96   7.8358E 00   2.1986E 00   2.7265E-03   1.0943E-02   1.2711E 02   1.1570E-03
 48    .6302    90.0   533.91   7.9881E 00   2.2010E 00   2.7415E-03   1.1022E-02   1.2796E 02   1.1632E-03
 49    .6722    90.0   542.15   8.5970E 00   2.1527E 00   2.7107E-03   1.0892E-02   1.3001E 02   1.1495E-03
 50    .7170    90.0   544.99   8.0456E 00   1.8947E 00   2.3942E-03   9.6193E-03   1.3069E 02   1.0152E-03
 51    .7583    90.0   539.42   7.2682E 00   1.8934E 00   2.3759E-03   9.5485E-03   1.2936E 02   1.0077E-03
 52    .7996    90.0   540.23   7.6176E 00   1.9844E 00   2.4926E-03   1.0017E-02   1.2956E 02   1.0572E-03
 53    .8409    90.0   541.48   7.7013E 00   1.9293E 00   2.4273E-03   9.7539E-03   1.2985E 02   1.0294E-03
 54    .8822    90.0   544.10   7.7762E 00   1.9088E 00   2.4095E-03   9.6810E-03   1.3046E 02   1.0217E-03
 55    .9235    90.0   545.36   7.9069E 00   1.9015E 00   2.4040E-03   9.6582E-03   1.3078E 02   1.0193E-03
 56    .9648    90.0   545.63   7.8018E 00   1.8954E 00   2.3972E-03   9.6308E-03   1.3084E 02   1.0164E-03
 57    .2524   135.0   495.58   1.6790E 00   4.9634E-01   5.9036E-04   2.3783E-03   1.1895E 02   2.5099E-04
 58    .2943   135.0   504.40   5.4010E 00   1.7317E 00   2.0815E-03   8.3814E-03   1.2104E 02   8.8453E-04
 59    .3363   135.0   507.10   6.0739E 00   1.9171E 00   2.3119E-03   9.3078E-03   1.2168E 02   9.8230E-04
 60    .3783   135.0   510.94   8.0174E 00   2.4905E 00   3.0174E-03   1.2145E-02   1.2259E 02   1.2818E-03
 61    .4203   135.0   515.82   1.1412E 01   3.4305E 00   4.1769E-03   1.6809E-02   1.2356E 02   1.7739E-03
 62    .4623   135.0   518.80   1.2161E 01   3.5335E 00   4.3180E-03   1.7374E-02   1.2427E 02   1.8336E-03
 63    .5043   135.0   522.27   1.3473E 01   3.4424E 00   4.2288E-03   1.7011E-02   1.2528E 02   1.7952E-03
 64    .5463   135.0   523.81   1.2782E 01   3.3943E 00   4.1775E-03   1.6803E-02   1.2565E 02   1.7733E-03
 65    .5882   135.0   527.15   1.2118E 01   3.2181E 00   3.9770E-03   1.5994E-02   1.2644E 02   1.6879E-03
 66    .6302   135.0   529.03   1.1868E 01   3.1515E 00   3.9038E-03   1.5698E-02   1.2689E 02   1.6567E-03
 67    .6722   135.0   540.77   1.2195E 01   2.9327E 00   3.6862E-03   1.4813E-02   1.2967E 02   1.5633E-03
 68    .7170   135.0   542.61   1.1858E 01   2.7925E 00   3.5182E-03   1.4137E-02   1.3012E 02   1.4920E-03
 69    .7583   135.0   532.13   7.7520E 00   2.1751E 00   2.7046E-03   1.0874E-02   1.2763E 02   1.1476E-03
 70    .7996   135.0   537.31   1.0644E 01   3.0926E 00   3.8705E-03   1.5557E-02   1.2886E 02   1.6418E-03
 71    .8409   135.0   538.85   1.0382E 01   2.8606E 00   3.5870E-03   1.4416E-02   1.2923E 02   1.5214E-03
 72    .8822   135.0   540.37   1.0931E 01   2.95[illegible] 00   3.7155E-03   1.4932E-02   1.2959E 02   1.5758E-03
 73    .9235   135.0   542.39   1.1516E 01   2.82[illegible] 00   3.5604E-03   1.4307E-02   1.3007E 02   1.5099E-03
 74    .9648   135.0   547.84   1.2606E 01   3.031[illegible] 00   3.8447E-03   1.5444E-02   1.3137E 02   1.6299E-03
 75    .2524   180.0   498.90   6.1689E 00   1.7924E 00   2.1404E-03   8.6211E-03   1.1974E 02   9.0983E-04
 76    .2943   180.0   504.85   4.6707E 00   1.4975E 00   1.8011E-03   7.2519E-03   1.2115E 02   7.6533E-04
 77    .3363   180.0   511.18   7.9242E 00   2.3425E 00   2.8389E-03   1.1427E-02   1.2265E 02   1.2059E-03
 78    .3783   180.0   517.16   1.1591E 01   3.4841E 00   4.2532E-03   1.7114E-02   1.2407E 02   1.8061E-03
 79    .4203   180.0   522.46   1.5011E 01   4.4374E 00   5.4523E-03   2.1933E-02   1.2533E 02   2.3146E-03
 80    .4623   180.0   526.67   1.5897E 01   4.5398E 00   5.6053E-03   2.2543E-02   1.2627E 02   2.3791E-03
 81    .5043   180.0   528.11   1.4745E 01   3.6938E 00   4.5704E-03   1.8379E-02   1.2667E 02   1.9397E-03
 82    .5463   180.0   529.7[illegible]   1.4526E 01   3.8573E 00   4.7824E-03   1.9230E-02   1.2706E 02   2.0294E-03
 83    .5882   180.0   530.15   1.2187E 01   3.2364E 00   4.0145E-03   1.6142E-02   1.2716E 02   1.7035E-03
 84    .6302   180.0   535.34   1.2269E 01   3.2581E 00   4.0677E-03   1.6351E-02   1.2840E 02   1.7256E-03
 85    .6722   180.0   548.54   1.3925E 01   3.3488E 00   4.2514E-03   1.7078E-02   1.3156E 02   1.8023E-03
 86    .7170   180.0   551.99   1.4164E 01   3.3355E 00   4.2527E-03   1.7080E-02   1.3236E 02   1.8025E-03
 87    .7583   180.0   539.71   1.1677E 01   2.8081E 00   3.5251E-03   1.4167E-02   1.2943E 02   1.4951E-03
 88    .7996   180.0   544.95   1.2444E 01   3.2416E 00   4.0962E-03   1.6457E-02   1.3068E 02   1.7368E-03
 89    .8409   180.0   546.38   1.3356E 01   3.4125E 00   4.3199E-03   1.7355E-02   1.3102E 02   1.8315E-03
 90    .8822   180.0   548.85   1.4566E 01   3.3566E 00   4.2625E-03   1.7122E-02   1.3161E 02   1.8070E-03
 91    .9235   180.0   550.37   1.4401E 01   3.5350E 00   4.4977E-03   1.8065E-02   1.3197E 02   1.9065E-03
 92    .9648   180.0   555.45   1.5758E 01   3.6312E 00   4.6502E-03   1.8673E-02   1.3318E 02   1.9705E-03
 93    .8822   225.0   548.11   1.1222E 01   2.8672E 00   3.6377E-03   1.4613E-02   1.3143E 02   1.5421E-03
 94    .9648   225.0   554.81   1.2096E 01   2.9088E 00   3.7219E-03   1.4946E-02   1.3303E 02   1.5773E-03
 95    .7170   270.0   551.79   8.9292E 00   1.9905E 00   2.5372E-03   1.0190E-02   1.3231E 02   1.0754E-03
 96    .7996   270.0   548.36   7.4374E 00   1.9750E 00   2.5064E-03   1.0068E-02   1.3149E 02   1.0626E-03
 97    .8822   270.0   550.72   7.4977E 00   1.9157E 00   2.4373E-03   9.7895E-03   1.3196E 02   1.0331E-03
 98    .9648   270.0   553.46   9.2298E 00   1.9791E 00   2.5280E-03   1.0152E-02   1.3271E 02   1.0714E-03
```

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 4 SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 4
MACH NO = 8
RE NO = 3.78 X 10**6
CONFIG 1
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 5.55
- 5.35
32.00
24.00
16.00
8.00
0.00
-8.00
-16.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

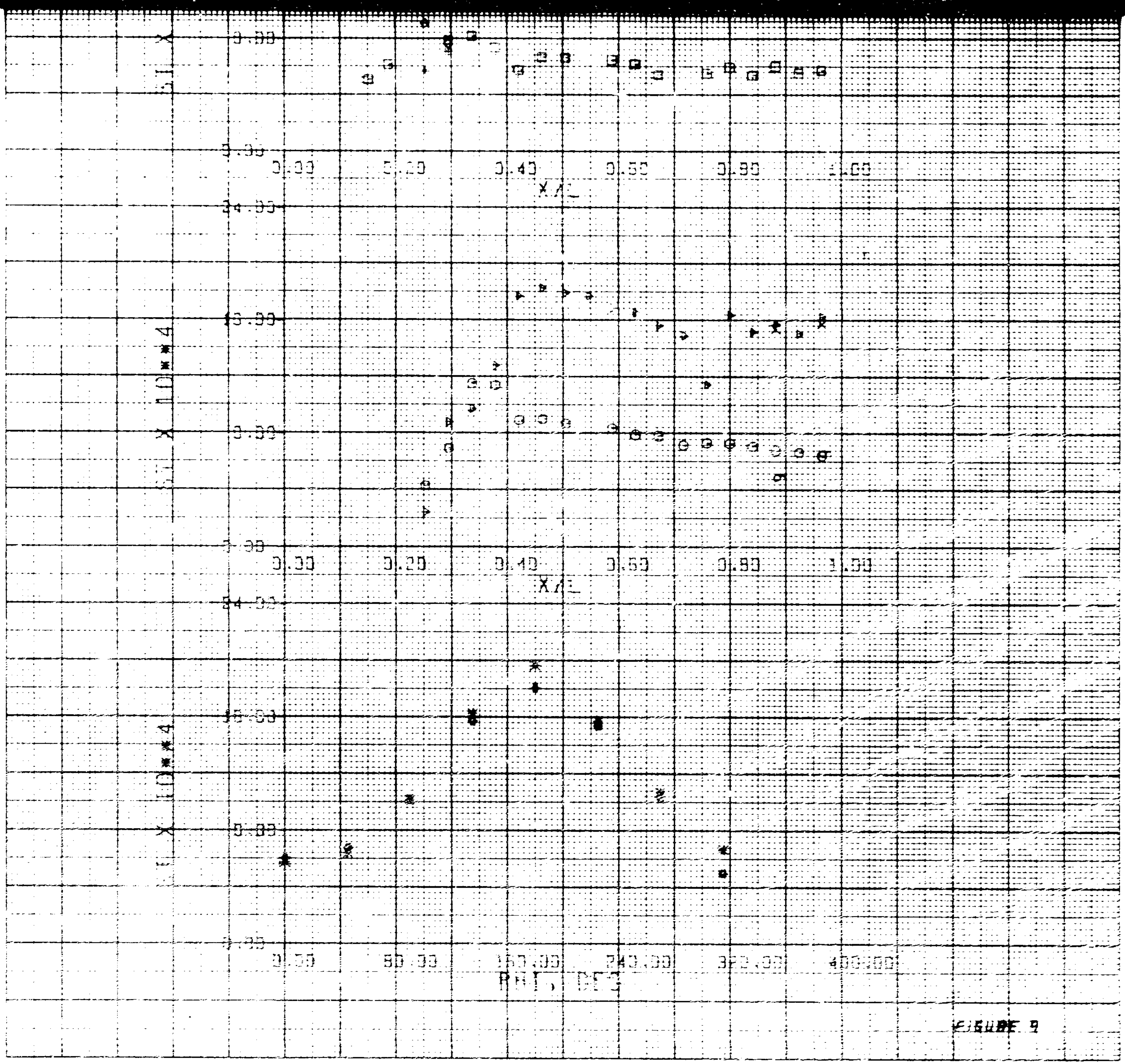
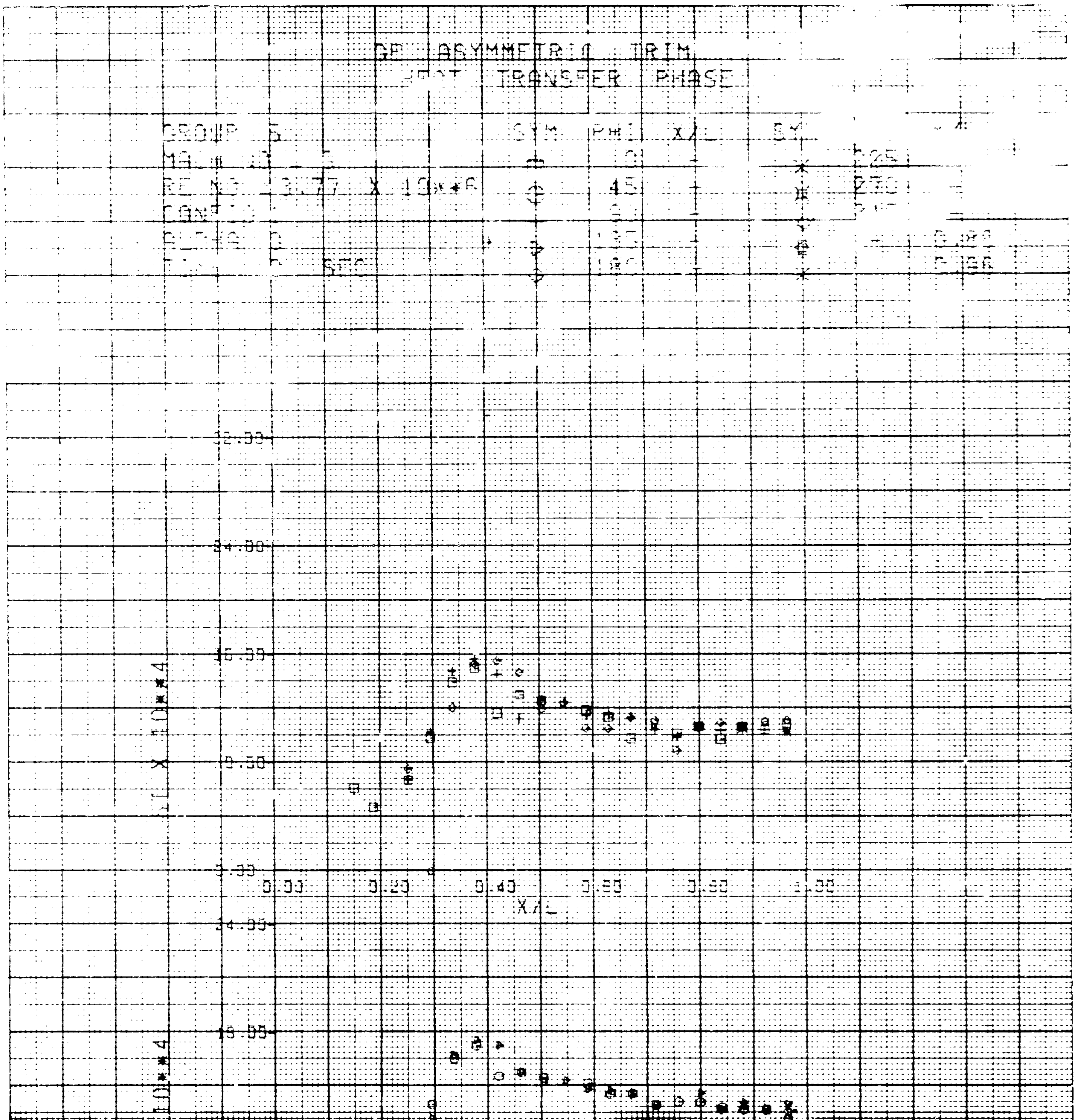

X 10**4
X 10**4
X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
80.00
160.00
240.00
320.00
400.00
PHI, DEG
FIGURE 9

Figure 9

```
                                        7/14/69

                          AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                           VON KARMAN GAS DYNAMICS FACILITY
                             50 INCH HYPERSONIC TUNNEL B
                                    VT0967-000
GROUP   CONFIG    RN/RADIUS-N    BETA-M     ALPHA-S     ROLL   ALP-P   DATE     MACH NO       PO          TO        TIME
  8        8         .04            0         .04          0      9     714        8.08       860.69     1337.51      .88
   T-INF      P-INF        Q-INF       V-INF       RHO-INF      MU-INF       RE/FT        RE/D          HO
 9.6921E 01  8.0139E-02  [illegible]  3.8591E 03  7.6298E-05  7.4031E-08  3.7734E 06  3.4590E 06  3.2790E 02

TC NO    X/L       PHI     TEMP      SLOPE       Q-DOT         HT           HM          HO          ST

   1  [illegible]   0     512.59  [illegible]  1.1093E 00  1.4417E-03  5.0021E-03  1.2298E 02  8.1245E-04
   2  [illegible]   0     500.80  6.1959E 00  9.2661E-01  1.1099E-03  4.4641E-03  1.2192E 02  4.7163E-04
   3  [illegible]   0     511.85  6.6143E 00  1.3049E 00  1.5804E-03  6.3608E-03  1.2281E 02  6.7143E-04
   4  [illegible]   0     522.06  9.0000E 00  1.8902E 00  2.3202E-03  9.3377E-03  1.2542E 02  9.6513E-04
   5   .3303        0     528.86  [illegible]  2.6611E 00  3.2906E-03  1.3231E-02  1.2684E 02  1.3967E-03
   6   .3703        0     533.12  9.6767E 00  2.0487E 00  3.5370E-03  1.4220E-02  1.2763E 02  1.5020E-03
   7   .4203        0     530.39  7.4654E 00  2.2215E 00  2.7528E-03  1.1068E-02  1.2725E 02  1.1683E-03
   8   .4623        0     535.17  8.4449E 00  2.4701E 00  3.0784E-03  1.2374E-02  1.2834E 02  1.3062E-03
   9   .5043        0     535.36  8.0182E 00  2.3030E 00  2.9700E-03  1.1938E-02  1.2835E 02  1.2602E-03
  10   .5463        0     527.80  2.9037E-02  7.1933E-03  9.0975E-06  3.5776E-05  1.2689E 02  3.7764E-06
  11   .5882        0     538.30  8.1356E 00  2.2[illegible]E 00  2.0046E-03  1.1272E-02  1.2910E 02  1.1898E-03
  12   .6302        0     540.51  7.9160E 00  2.1421E 00  2.6879E-03  1.0091E-02  1.2964E 02  1.1401E-03
  13   .6722        0     542.17  7.9439E 00  1.8398E 00  2.3150E-03  9.3014E-03  1.3016E 02  9.8182E-04
  14   .8120    315.0     545.55  5.1125E 00  1.3318E 00  1.6917E-03  6.7559E-03  1.3082E 02  7.1314E-04
  15   .7583        0     547.00  7.8741E 00  1.8936E 00  2.395[illegible]  9.0225E-03  1.3117E 02  1.0157E-03
  16   .7996        0     547.[illegible]  7.1015E 00  1.9925E 00  2.5228E  [illegible].0134E-02  1.3134E 02  1.0697E-03
  17   .8409        0     547.10  7.1263E 00  1.8208E 00  2.3039E-03  [illegible].2547E-03  1.3121E 02  9.7690E-04
  18   .8822        0     550.40  7.9304E 00  1.9867E 00  2.5244E-0   [illegible].0134E-02  1.3200E 02  1.0702E-03
  19   .9235        0     550.72  7.7272E 00  1.9358E 00  2.4604E-0   9.9815E-03  1.3206E 02  1.0431E-03
  20   .9648        0     551.95  8.6138E 00  2.0234E 00  2.5744E-03  1.0339E-02  1.3225E 02  1.0913E-03
  21   .2524     45.0     509.51  5.2226E 00  1.5439E 00  1.8646E-03  7.5055E-03  1.2226E 02  7.9225E-04
  22   .2943     45.0     520.46  6.4152E 00  2.0568E 00  2.5173E-03  1.0127E-02  1.2485E 02  1.0690E-03
  23   .3363     45.0     527.65  6.9434E 00  2.6084E 00  3.3172E-03  1.3340E-02  1.2642E 02  1.4081E-03
  24   .3783     45.0     531.31  9.4944E 00  2.8540E 00  3.5402E-03  1.4213E-02  1.2744E 02  1.5024E-03
  25   .4203     45.0     530.38  8.3660E 00  2.4293E 00  3.0105E-03  1.2104E-02  1.2726E 02  1.2777E-03
  26   .4623     45.0     534.59  8.7931E 00  2.4672E 00  3.0727E-03  1.2352E-02  1.2821E 02  1.3038E-03
  27   .5043     45.0     537.32  6.9885E 00  2.3869E 00  2.9829E-03  1.1989E-02  1.2896E 02  1.2655E-03
  28   .9648    315.0     555.90  7.7704E 00  1.8606E 00  2.3907E-03  9.5990E-03  1.3329E 02  1.0132E-03
  29   .5882     45.0     539.18  8.3427E 00  2.2987E 00  2.8794E-03  1.1571E-02  1.2931E 02  1.2214E-03
  30   .6302     45.0     541.91  7.9444E 00  2.1493E 00  2.7015E-03  1.0855E-02  1.2996E 02  1.1458E-03
  31   .6722     45.0     546.87  8.7337E 00  2.1439E 00  2.7115E-03  1.0892E-02  1.3114E 02  1.1498E-03
  32   .7170     45.0     549.01  8.3953E 00  1.9770E 00  2.5073E-03  1.0071E-02  1.3165E 02  1.0630E-03
  33   .7583     45.0     548.19  7.3299E 00  2.0196E 00  2.5587E-03  1.0278E-02  1.3145E 02  1.0849E-03
  34   .7996     45.0     548.78  7.1663E 00  2.0107E 00  2.5493E-03  1.0240E-02  1.3159E 02  1.0809E-03
  35   .8409     45.0     550.96  7.1363E 00  1.9306E 00  2.4546E-03  9.8579E-03  1.3211E 02  1.0406E-03
  36   .8822     45.0     552.44  7.2454E 00  1.9057E 00  2.4275E-03  9.7483E-03  1.3247E 02  1.0290E-03
  37   .9235     45.0     552.59  7.4184E 00  1.8955E 00  2.4148E-03  9.6975E-03  1.3250E 02  1.0236E-03
  38   .9648     45.0     553.22  7.3930E 00  1.7779E 00  2.2668E-03  9.1028E-03  1.3265E 02  9.6087E-04
  39   .2524     90.0     512.12  4.4531E 00  1.3164E 00  1.5949E-03  6.4187E-03  1.2288E 02  6.7754E-04
  40   .2943     90.0     522.87  6.1691E 00  1.9779E 00  2.4280E-03  9.7641E-03  1.2543E 02  1.0309E-03
  41   .3363     90.0     528.95  8.9209E 00  2.8157E 00  3.4824E-03  1.4003E-02  1.2687E 02  1.4781E-03
  42   .3783     90.0     530.97  9.4729E 00  2.9899E 00  3.7071E-03  1.4904E-02  1.2735E 02  1.5733E-03
  43   .4203     90.0     532.96  9.3446E 00  2.7623E 00  3.4330E-03  1.3801E-02  1.2780E 02  1.4568E-03
  44   .4623     90.0     530.77  6.9688E 00  2.1461E 00  2.6603E-03  1.0696E-02  1.2731E 02  1.1290E-03
  45   .5043     90.0     535.05  8.7285E 00  2.4050E 00  2.9970E-03  1.2047E-02  1.2832E 02  1.2716E-03
  46   .5463     90.0     535.68  8.2929E 00  2.3682E 00  2.9535E-03  1.1872E-02  1.2847E 02  1.2531E-03
  47   .5882     90.0     538.14  7.7419E 00  2.1722E 00  2.7174E-03  1.0921E-02  1.2906E 02  1.1528E-03
  48   .6302     90.0     541.01  7.9230E 00  2.1830E 00  2.7408E-03  1.1013E-02  1.2974E 02  1.1625E-03
  49   .6722     90.0     543.43  8.5215E 00  2.1348E 00  2.6951E-03  1.0827E-02  1.3079E 02  1.1429E-03
  50   .7170     90.0     548.31  8.7485E 00  1.9424E 00  2.4613E-03  9.8863E-03  1.3148E 02  1.0436E-03
  51   .7583     90.0     544.51  7.1450E 00  1.8613E 00  2.3471E-03  9.4298E-03  1.3058E 02  9.9537E-04
  52   .7996     90.0     546.21  7.7330E 00  2.0144E 00  2.5457E-03  1.0227E-02  1.3098E 02  1.0795E-03
  53   .8409     90.0     546.25  7.7344E 00  1.9376E 00  2.4487E-03  9.8370E-03  1.3099E 02  1.0384E-03
  54   .8822     90.0     548.37  7.9618E 00  1.9544E 00  2.4766E-03  9.9478E-03  1.3150E 02  1.0501E-03
  55   .9235     90.0     549.60  8.0865E 00  1.9467E 00  2.4662E-03  9.9058E-03  1.3165E 02  1.0456E-03
  56   .9648     90.0     549.97  7.0817E 00  1.9194E 00  2.4345E-03  9.7782E-03  1.3166E 02  1.0322E-03
  57   .2524    135.0     505.48  1.1319E 00  3.9669E-01  4.7670E-04  1.9195E-03  1.2130E 02  2.0262E-04
  58   .2943    135.0     515.63  5.8590E 00  1.8785E 00  2.2856E-03  9.1970E-03  1.2371E 02  9.7081E-04
  59   .3363    135.0     520.87  8.7336E 00  2.7566E 00  3.3755E-03  1.3579E-02  1.2495E 02  1.4333E-03
  60   .3783    135.0     523.02  9.5533E 00  2.9676E 00  3.6435E-03  1.4655E-02  1.2546E 02  1.5469E-03
  61   .4203    135.0     523.84  9.6057E 00  2.8875E 00  3.5487E-03  1.4273E-02  1.2566E 02  1.5066E-03
  62   .4623    135.0     524.69  8.6138E 00  2.5628E 00  3.0792E-03  1.2384E-02  1.2586E 02  1.3072E-03
  63   .5043    135.0     527.38  9.2208E 00  2.3560E 00  2.9082E-03  1.1695E-02  1.2650E 02  1.2344E-03
  64   .5463    135.0     528.58  8.9407E 00  2.3742E 00  2.9350E-03  1.1802E-02  1.2678E 02  1.2457E-03
  65   .5882    135.0     531.86  8.6847E 00  2.2531E 00  2.7937E-03  1.1232E-02  1.2736E 02  1.1856E-03
  66   .6302    135.0     532.96  8.4430E 00  2.2316E 00  2.7737E-03  1.1151E-02  1.2782E 02  1.1770E-03
  67   .6722    135.0     546.96  8.4681E 00  2.1422E 00  2.6893E-03  1.0807E-02  1.2973E 02  1.1407E-03
  68   .7170    135.0     542.50  8.4431E 00  1.9883E 00  2.5010E-03  1.0049E-02  1.3010E 02  1.0607E-03
  69   .7583    135.0     539.41  9.1111E 00  1.4902E 00  1.8579E-03  7.4679E-03  1.2842E 02  7.8829E-04
  70   .7996    135.0     539.29  7.4692E 00  2.1702E 00  2.7189E-03  1.0926E-02  1.2933E 02  1.1533E-03
  71   .8409    135.0     540.30  6.9871E 00  1.9252E 00  2.4149E-03  9.7041E-03  1.2957E 02  1.0243E-03
  72   .8822    135.0     541.64  7.5053E 00  2.0405E 00  2.5513E-03  1.0252E-02  1.2989E 02  1.0821E-03
  73   .9235    135.0     543.96  7.8329E 00  1.9227E 00  2.4229E-03  9.7344E-03  1.3044E 02  1.0275E-03
  74   .9648    135.0     546.63  8.7742E 00  1.9898E 00  2.5159E-03  1.0107E-02  1.3108E 02  1.0668E-03
  75   .2524    180.0     508.82  5.0944E 00  1.4802E 00  1.7863E-03  7.1903E-03  1.2209E 02  7.5898E-04
  76   .2943    180.0     501.07  6.9063E 02  2.2143E 02  2.6471E-01  1.0660E 00  1.2024E 02  1.1252E-01
  77   .3363    180.0     521.72  7.3648E 00  2.3249E 00  2.8499E-03  1.1464E-02  1.2515E 02  1.2101E-03
  78   .3783    180.0     525.41  9.7740E 00  2.9381E 00  3.6178E-03  1.4550E-02  1.2603E 02  1.5359E-03
  79   .4203    180.0     528.95  1.0654E 01  2.9720E 00  3.6716E-03  1.4764E-02  1.2666E 02  1.5584E-03
  80   .4623    180.0     530.25  9.7902E 00  2.7958E 00  3.4633E-03  1.3925E-02  1.2718E 02  1.4698E-03
  81   .5043    180.0     531.67  9.1117E 00  2.2827E 00  2.8327E-03  1.1388E-02  1.2752E 02  1.2021E-03
  82   .5463    180.0     532.84  8.9533E 00  2.3510E 00  2.9217E      1.1745E-02  1.2780E 02  1.2398E-03
  83   .5882    180.0     533.78  7.5393E 00  2.0021E 00  2.4910E-03  1.0013E-02  1.2802E 02  1.0570E-03
  84   .6302    180.0     538.18  7.4591E 00  1.9808E 00  2.4780E-03  9.9590E-03  1.2907E 02  1.0512E-03
  85   .6722    180.0     547.08  8.7987E 00  2.1159E 00  2.6768E-03  1.0753E-02  1.3118E 02  1.1350E-03
  86   .7170    180.0     549.25  8.8255E 00  2.0783E 00  2.6366E-03  1.0590E-02  1.3171E 02  1.1178E-03
  87   .7583    180.0     542.46  6.9642E 00  1.6748E 00  2.1065E-03  8.4639E-03  1.3009E 02  8.9342E-04
  88   .7996    180.0     545.32  7.5682E 00  1.9715E 00  2.4887E-03  9.9990E-03  1.3077E 02  1.0554E-03
  89   .8409    180.0     546.21  8.6109E 00  2.0469E 00  2.5867E-03  1.0391E-02  1.3098E 02  1.0969E-03
  90   .8822    180.0     547.88  8.6521E 00  1.9938E 00  2.5256E-03  1.0142E-02  1.3138E 02  1.0706E-03
  91   .9235    180.0     549.18  8.3930E 00  2.0602E 00  2.6134E-03  1.0497E-02  1.3169E 02  1.1080E-03
  92   .9648    180.0     553.91  9.9718E 00  2.0675E 00  2.6384E-03  1.0595E-02  1.3282E 02  1.1183E-03
  93   .8822    225.0     549.48  7.4256E 00  1.9484E 00  2.4725E-03  9.9307E-03  1.3176E 02  1.0483E-03
  94   .9648    225.0     554.60  9.6321E 00  1.9316E 00  2.4672E-03  9.9065E-03  1.3298E 02  1.0457E-03
  95   .7170    270.0     554.19  8.8180E 00  1.9880E 00  2.5379E-03  1.0191E-02  1.3288E 02  1.0757E-03
  96   .7996    270.0     554.31  7.4977E 00  1.9910E 00  2.5422E-03  1.0208E-02  1.3291E 02  1.0775E-03
  97   .8822    270.0     554.25  7.5116E 00  1.9448E 00  2.4830E-03  9.9704E-03  1.3290E 02  1.0524E-03
  98   .9648    270.0     556.13  7.8572E 00  1.8895E 00  2.4181E-03  9.7049E-03  1.3335E 02  1.0248E-03
```


GP ASYMMETRIC TRIM
TRANSFER PHASE
GROUP 5
RE NO 3.77 X 10**6
ALPHA 0
SEC
SYM PHI X/L SYM
0
45
135
180
225
270
0.33
0.08
12.00
14.00
16.00
8.50
3.00
14.00
18.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
X 10**4
10**4

2

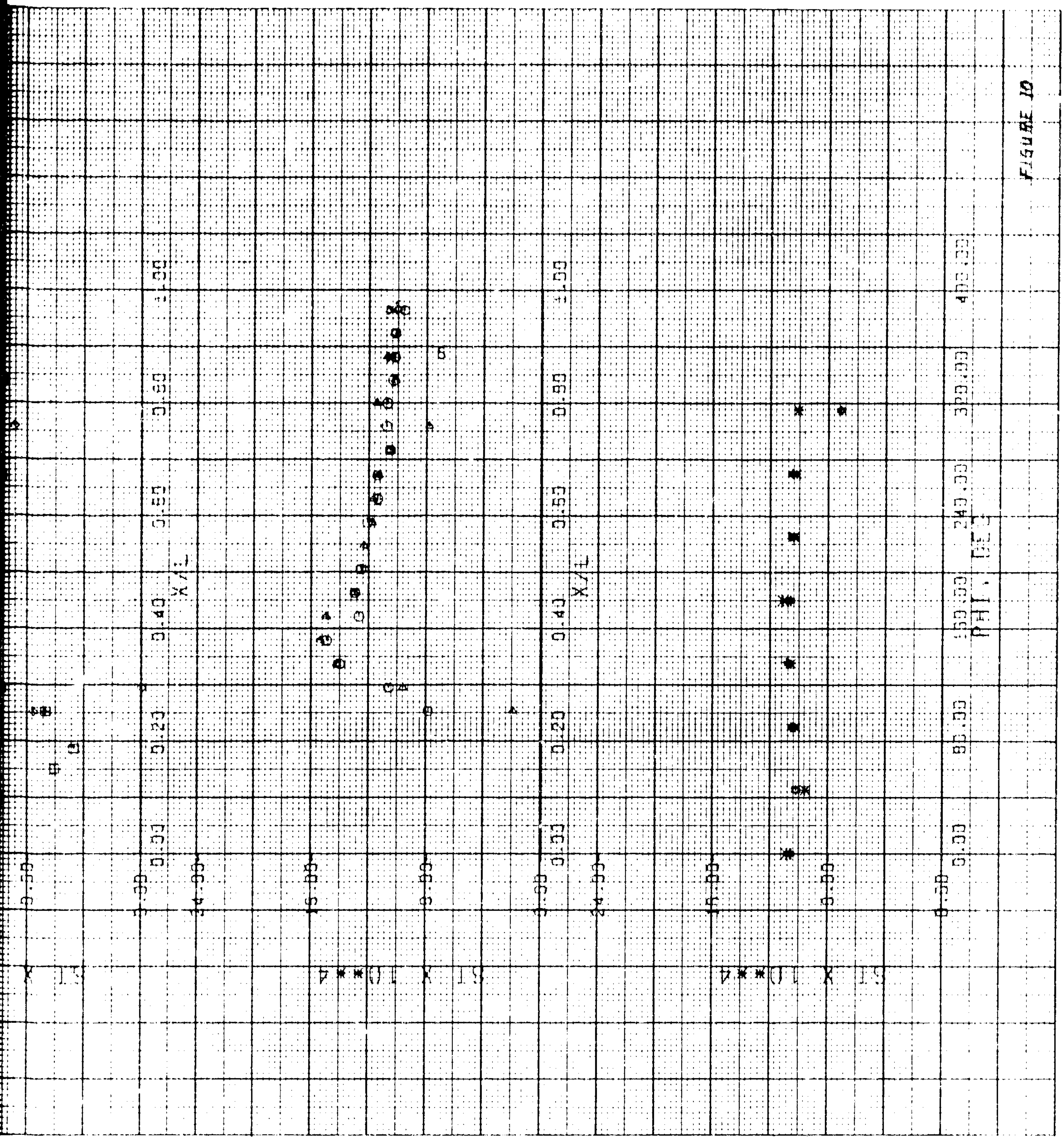


FIGURE 10
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
80.00
160.00
240.00
320.00
400.00
PHI, DEG
CL X 10**4

Figure 10

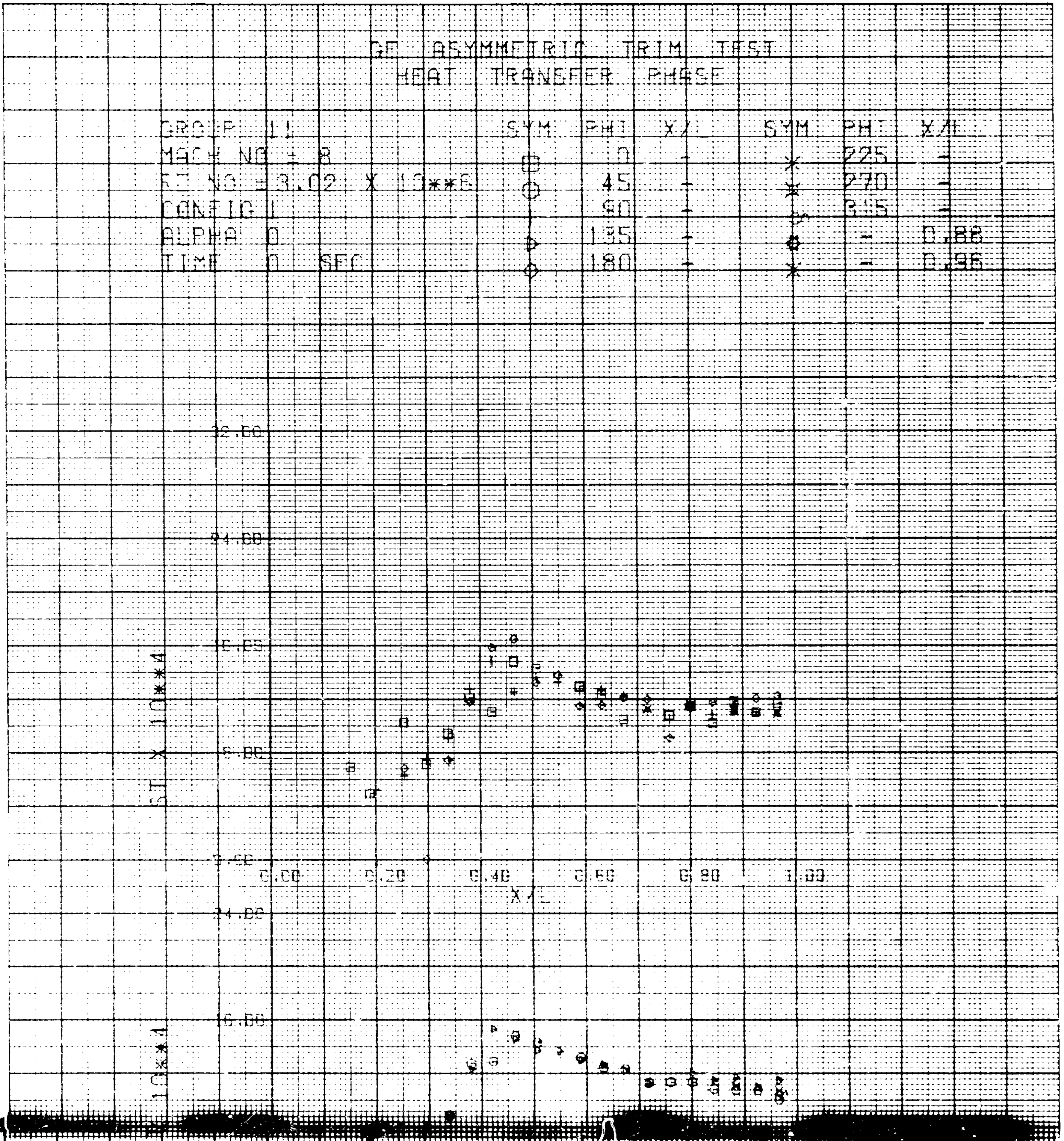
3

```
                                   7/14/69

                     ARO, INC., ARNOLD AFS, TENNESSEE
                     VON KARMAN GAS DYNAMICS FACILITY
                       50 INCH HYPERSONIC TUNNEL B
                               VT0947-B00
GROUP  CONFIG   ALPHA-M    BETA-M     ALPHA-S     ROLL   ALP-P  DATE    MACH NO      PO          TO         TIME
 11      3        .10        0          .10         0      0     714      8.08      676.37     1313.68       -.00
  T-INF       P-INF        Q-INF       V-INF       RHO-INF      MU-INF       RE/FT        RE/D         MU
9.5100E 01  6.8665E-02  3.0762E 00  3.8243E 03  6.0527E-05  7.0629E-08  3.8207E 06  2.7692E 06  3.2172E 02

TC NO   X/L     PHI    TEMP     SLOPE       Q-STDW       HT          HW          HW          ST

  1    .1900     0    510.37  4.4709E 00  1.1187E 00  1.2785E-03  5.1507E-03  1.2439E 02  6.9159E-04
  2    .1047     0    511.21  3.1674E 00  7.9514E-01  9.1634E-04  3.6929E-03  1.2266E 02  4.9586E-04
  3    .2524     0    512.17  5.1374E 00  1.5187E 00  1.8952E-03  7.6375E-03  1.2289E 02  1.0255E-03
  4    .2943     0    518.51  3.1233E 00  1.0489E 00  1.3194E-03  5.3153E-03  1.2439E 02  7.1369E-04
  5    .3363     0    523.08  4.1760E 00  1.3812E 00  1.7474E-03  7.0378E-03  1.2548E 02  9.4497E-04
  6    .3783     0    526.00  5.4016E 00  1.7620E 00  2.2375E-03  9.0100E-03  1.2617E 02  1.2098E-03
  7    .4203     0    526.36  5.5442E 00  1.6109E 00  2.0466E-03  8.2406E-03  1.2426E 02  1.1065E-03
  8    .4623     0    530.30  7.7923E 00  2.1670E 00  2.7414E-03  1.1037E-02  1.2719E 02  1.4819E-03
  9    .5043     0    530.48  7.4445E 00  2.0882E 00  2.6413E-03  1.0634E-02  1.2724E 02  1.4278E-03
 10    .5463     0    531.05 -6.9016E-03 -1.9589E-03 -2.5036E-06 -1.0079E-05  1.2737E 02 -1.3533E-06
 11    .5882     0    534.13  6.7085E 00  1.8764E 00  2.4000E-03  9.6601E-03  1.2810E 02  1.2971E-03
 12    .6302     0    536.62  6.4242E 00  1.7651E 00  2.2720E-03  9.1439E-03  1.2870E 02  1.2278E-03
 13    .6722     0    537.29  4.3960E 00  1.5021E 00  1.9352E-03  7.7841E-03  1.2886E 02  1.0457E-03
 99    .8022   315.0  548.09  4.1617E 00  1.0841E 00  1.4164E-03  5.6969E-03  1.3143E 02  7.6492E-04
 15    .7583     0    545.71  4.1674E 00  1.5312E 00  1.9944E-03  8.0227E-03  1.3087E 02  1.0772E-03
 16    .7996     0    548.39  5.7899E 00  1.6245E 00  2.1233E-03  8.5399E-03  1.3150E 02  1.1467E-03
 17    .8409     0    547.99  5.4494E 00  1.4435E 00  1.8857E-03  7.5849E-03  1.3141E 02  1.0184E-03
 18    .8822     0    550.78  6.6642E 00  1.6695E 00  2.1889E-03  8.8027E-03  1.3207E 02  1.1819E-03
 19    .9235     0    549.51  6.1998E 00  1.5532E 00  2.0331E-03  8.1764E-03  1.3177E 02  1.0978E-03
 20    .9648     0    548.20  5.8586E 00  1.6494E 00  2.1552E-03  8.6682E-03  1.3145E 02  1.1639E-03
 21    .2524    45.0  509.99  3.5521E 00  1.0500E 00  1.3068E-03  5.2671E-03  1.2237E 02  7.0721E-04
 22    .2943    45.0  517.96  3.1257E 00  1.0603E 00  1.3404E-03  5.3998E-03  1.2426E 02  7.2504E-04
 23    .3363    45.0  523.36  4.3261E 00  1.3084E 00  1.6458E-03  6.6285E-03  1.2554E 02  8.9001E-04
 24    .3783    45.0  527.48  6.1702E 00  1.8548E 00  2.3597E-03  9.5016E-03  1.2652E 02  1.2758E-03
 25    .4203    45.0  529.26  6.6624E 00  1.8777E 00  2.3944E-03  9.6400E-03  1.2695E 02  1.2944E-03
 26    .4623    45.0  532.71  7.4176E 00  2.1373E 00  2.7375E-03  1.1019E-02  1.2777E 02  1.4796E-03
 27    .5043    45.0  535.23  7.7476E 00  2.0574E 00  2.6436E-03  1.0640E-02  1.2837E 02  1.4286E-03
100    .9648   315.0  553.87  4.1693E 00  1.4836E 00  1.9531E-03  7.8529E-03  1.3281E 02  1.0544E-03
 29    .5882    45.0  537.67  6.4793E 00  1.8955E 00  2.4432E-03  9.8321E-03  1.2895E 02  1.3202E-03
 30    .6302    45.0  539.84  6.5845E 00  1.7814E 00  2.3026E-03  9.2652E-03  1.2946E 02  1.2440E-03
 31    .6722    45.0  542.51  7.1717E 00  1.7604E 00  2.2834E-03  9.1867E-03  1.3010E 02  1.2335E-03
 32    .7170    45.0  545.71  6.8350E 00  1.6090E 00  2.0967E-03  8.4341E-03  1.3087E 02  1.1324E-03
 33    .7583    45.0  548.98  5.8399E 00  1.6091E 00  2.1047E-03  8.4648E-03  1.3164E 02  1.1366E-03
 34    .7996    45.0  551.01  5.7149E 00  1.6035E 00  2.1030E-03  8.4571E-03  1.3213E 02  1.1355E-03
 35    .8409    45.0  553.01  5.6390E 00  1.5256E 00  2.0061E-03  8.0663E-03  1.3260E 02  1.0831E-03
 36    .8822    45.0  554.02  5.7680E 00  1.5171E 00  1.9976E-03  8.0319E-03  1.3284E 02  1.0784E-03
 37    .9235    45.0  553.98  5.9093E 00  1.5097E 00  1.9880E-03  7.9932E-03  1.3283E 02  1.0733E-03
 38    .9648    45.0  552.75  5.4995E 00  1.4187E 00  1.8649E-03  7.4989E-03  1.3254E 02  1.0069E-03
 39    .2524    90.0  514.08  1.1145E 00  9.2068E-01  1.1517E-03  4.6408E-03  1.2334E 02  6.2312E-04
 40    .2943    90.0  521.97  3.4162E 00  1.0953E 00  1.3838E-03  5.5735E-03  1.2521E 02  7.4836E-04
 41    .3363    90.0  527.51  4.1677E 00  1.3155E 00  1.6737E-03  6.7391E-03  1.2653E 02  9.0486E-04
 42    .3783    90.0  530.96  5.8379E 00  1.8426E 00  2.3547E-03  9.4796E-03  1.2735E 02  1.2728E-03
 43    .4203    90.0  533.59  7.2381E 00  2.1373E 00  2.7405E-03  1.1031E-02  1.2798E 02  1.4811E-03
 44    .4623    90.0  531.89  5.6408E 00  1.8141E 00  2.3211E-03  9.3436E-03  1.2757E 02  1.2546E-03
 45    .5043    90.0  535.48  7.1122E 00  1.9596E 00  2.5188E-03  1.0137E-02  1.2842E 02  1.3612E-03
 46    .5463    90.0  537.72  6.4763E 00  1.9066E 00  2.4576E-03  9.8902E-03  1.2896E 02  1.3280E-03
 47    .5882    90.0  538.86  6.4160E 00  1.8082E 00  2.3240E-03  9.3517E-03  1.2923E 02  1.2557E-03
 48    .6302    90.0  540.61  6.5885E 00  1.8153E 00  2.3408E-03  9.4508E-03  1.2965E 02  1.2690E-03
 49    .6722    90.0  543.09  6.9765E 00  1.7675E 00  2.2687E-03  9.1271E-03  1.3024E 02  1.2255E-03
 50    .7170    90.0  545.93  6.6630E 00  1.5691E 00  2.0442E-03  8.2230E-03  1.3091E 02  1.1041E-03
 51    .7583    90.0  546.62  5.7055E 00  1.4863E 00  1.9381E-03  7.7958E-03  1.3108E 02  1.0467E-03
 52    .7996    90.0  548.89  6.1790E 00  1.6098E 00  2.1055E-03  8.4679E-03  1.3162E 02  1.1370E-03
 53    .8409    90.0  550.09  4.1035E 00  1.5290E 00  2.0029E-03  8.0550E-03  1.3191E 02  1.0816E-03
 54    .8822    90.0  551.50  6.1324E 00  1.5544E 00  2.0490E-03  8.2013E-03  1.3224E 02  1.1015E-03
 55    .9235    90.0  550.77  6.4464E 00  1.5502E 00  2.0325E-03  8.1736E-03  1.3207E 02  1.0975E-03
 56    .9648    90.0  548.38  6.3524E 00  1.5276E 00  1.9966E-03  8.0303E-03  1.3150E 02  1.0782E-03
 57    .2524   135.0  509.06  9.2138E-01  2.7237E-01  3.3859E-04  1.3647E-03  1.2215E 02  1.8324E-04
 58    .2943   135.0  517.56  3.4495E 00  1.1701E 00  1.4701E-03  5.9226E-03  1.2417E 02  7.9524E-04
 59    .3363   135.0  520.97  4.1633E 00  1.3140E 00  1.6581E-03  6.6787E-03  1.2498E 02  8.9675E-04
 60    .3783   135.0  523.90  5.9035E 00  1.8028E 00  2.2832E-03  9.1953E-03  1.2567E 02  1.2347E-03
 61    .4203   135.0  526.24  7.6634E 00  2.2375E 00  2.8422E-03  1.1445E-02  1.2623E 02  1.5367E-03
 62    .4623   135.0  527.22  7.2802E 00  2.1153E 00  2.6903E-03  1.0833E-02  1.2646E 02  1.4545E-03
 63    .5043   135.0  529.08  7.8227E 00  1.9988E 00  2.5482E-03  1.0259E-02  1.2690E 02  1.3775E-03
 64    .5463   135.0  530.11  7.4671E 00  1.9829E 00  2.5312E-03  1.0191E-02  1.2715E 02  1.3683E-03
 65    .5882   135.0  532.69  7.0734E 00  1.8784E 00  2.4057E-03  9.6839E-03  1.2776E 02  1.3003E-03
 66    .6302   135.0  533.96  6.4953E 00  1.8310E 00  2.3489E-03  9.4547E-03  1.2806E 02  1.2695E-03
 67    .6722   135.0  538.55  7.2896E 00  1.7530E 00  2.2621E-03  9.1031E-03  1.2916E 02  1.2223E-03
 68    .7170   135.0  540.37  6.4374E 00  1.6101E 00  2.0827E-03  8.3800E-03  1.2959E 02  1.1252E-03
 69    .7583   135.0  537.85  4.2242E 00  1.1852E 00  1.5281E-03  6.1493E-03  1.2899E 02  8.2568E-04
 70    .7996   135.0  542.01  5.8975E 00  1.7136E 00  2.2212E-03  8.9368E-03  1.2998E 02  1.2000E-03
 71    .8409   135.0  543.10  5.9568E 00  1.6413E 00  2.1305E-03  8.5712E-03  1.3024E 02  1.1509E-03
 72    .8822   135.0  543.71  6.1490E 00  1.6638E 00  2.1614E-03  8.6951E-03  1.3038E 02  1.1675E-03
 73    .9235   135.0  544.38  5.7924E 00  1.5691E 00  2.0402E-03  8.2073E-03  1.3054E 02  1.1020E-03
 74    .9648   135.0  546.94  6.7881E 00  1.6324E 00  2.1296E-03  8.5658E-03  1.3116E 02  1.1501E-03
 75    .2524   180.0  509.63  3.4752E 00  1.0098E 00  1.2561E-03  5.0628E-03  1.2228E 02  6.7979E-04
 76    .2943   180.0 1033.57  2.4771E-06  7.9420E-07  2.8368E-09  1.1116E-08  2.5829E 02  1.4926E-09
 77    .3363   180.0  523.26  3.4915E 00  1.0913E 00  1.3809E-03  5.5617E-03  1.2552E 02  7.4677E-04
 78    .3783   180.0  526.43  5.7179E 00  1.7188E 00  2.1838E-03  8.7937E-03  1.2627E 02  1.1807E-03
 79    .4203   180.0  529.11  7.7770E 00  2.2992E 00  2.9313E-03  1.1802E-02  1.2691E 02  1.5846E-03
 80    .4623   180.0  531.15  8.3662E 00  2.3891E 00  3.0539E-03  1.2294E-02  1.2740E 02  1.6507E-03
 81    .5043   180.0  532.59  7.6309E 00  1.9117E 00  2.4481E-03  9.8546E-03  1.2774E 02  1.3232E-03
 82    .5463   180.0  533.90  7.4869E 00  1.9881E 00  2.5502E-03  1.0265E-02  1.2805E 02  1.3783E-03
 83    .5882   180.0  534.77  6.7455E 00  1.6585E 00  2.1298E-03  8.5723E-03  1.2826E 02  1.1510E-03
 84    .6302   180.0  539.05  6.2162E 00  1.6507E 00  2.1315E-03  8.5772E-03  1.2928E 02  1.1517E-03
 85    .6722   180.0  544.31  7.1080E 00  1.7233E 00  2.2404E-03  9.0179E-03  1.3053E 02  1.2102E-03
 86    .7170   180.0  546.37  7.2152E 00  1.6941E 00  2.2150E-03  8.9094E-03  1.3102E 02  1.1963E-03
 87    .7583   180.0  543.73  5.1866E 00  1.2954E 00  1.6828E-03  6.7701E-03  1.3039E 02  9.0902E-04
 88    .7996   180.0  547.07  6.1773E 00  1.6092E 00  2.0996E-03  8.4453E-03  1.3119E 02  1.1360E-03
 89    .8409   180.0  547.90  6.5157E 00  1.6648E 00  2.1746E-03  8.7443E-03  1.3138E 02  1.1744E-03
 90    .8822   180.0  548.71  7.0179E 00  1.6172E 00  2.1157E-03  8.5049E-03  1.3162E 02  1.1422E-03
 91    .9235   180.0  549.52  8.9247E 00  1.6998E 00  2.2250E-03  8.9482E-03  1.3177E 02  1.2015E-03
 92    .9648   180.0  551.76  7.6905E 00  1.7238E 00  2.2630E-03  9.1001E-03  1.3230E 02  1.2219E-03
 93    .8822   225.0  550.84  6.1326E 00  1.5669E 00  2.0546E-03  8.2624E-03  1.3208E 02  1.1096E-03
 94    .9648   225.0  552.81  6.2820E 00  1.5109E 00  1.9863E-03  7.9867E-03  1.3255E 02  1.0724E-03
 95    .7170   270.0  550.58  7.0557E 00  1.5907E 00  2.0851E-03  8.3851E-03  1.3202E 02  1.1259E-03
 96    .7996   270.0  555.79  6.3929E 00  1.6180E 00  2.1356E-03  8.5850E-03  1.3326E 02  1.1527E-03
 97    .8822   270.0  557.77  6.1835E 00  1.5544E 00  2.0569E-03  8.2684E-03  1.3374E 02  1.1102E-03
 98    .9648   270.0  555.05  6.1533E 00  1.5278E 00  2.0161E-03  8.1054E-03  1.3323E 02  1.0883E-03
```

GE ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

GROUP 11 SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 11
MACH NO = 8
RE NO = 3.02 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96
32.00
24.00
16.00
8.00
0.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
10**4

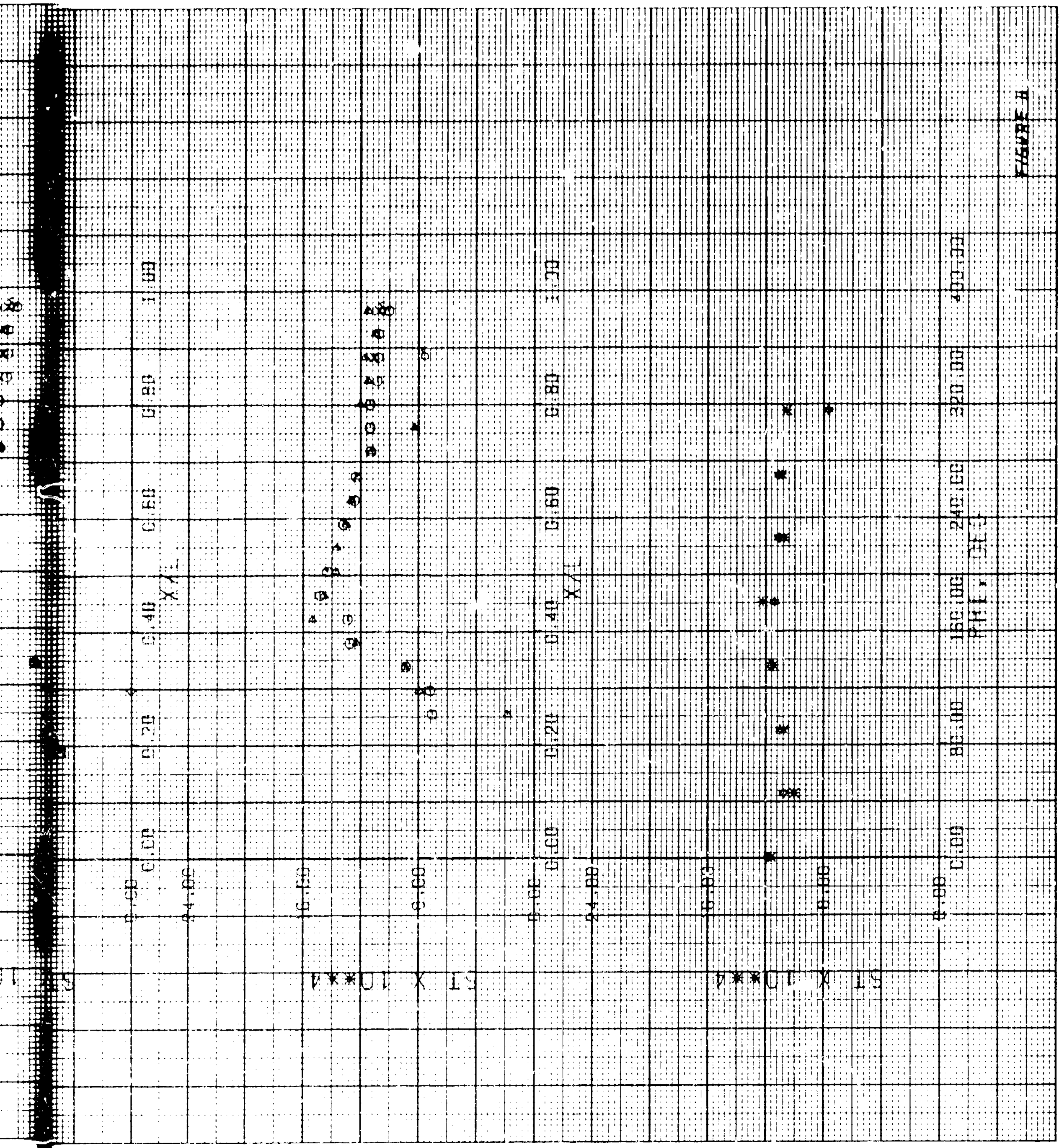


FIGURE 11
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
8.00
16.00
24.00
ST X 10**4
0.00
80.00
160.00
240.00
320.00
400.00
PHI, DEG

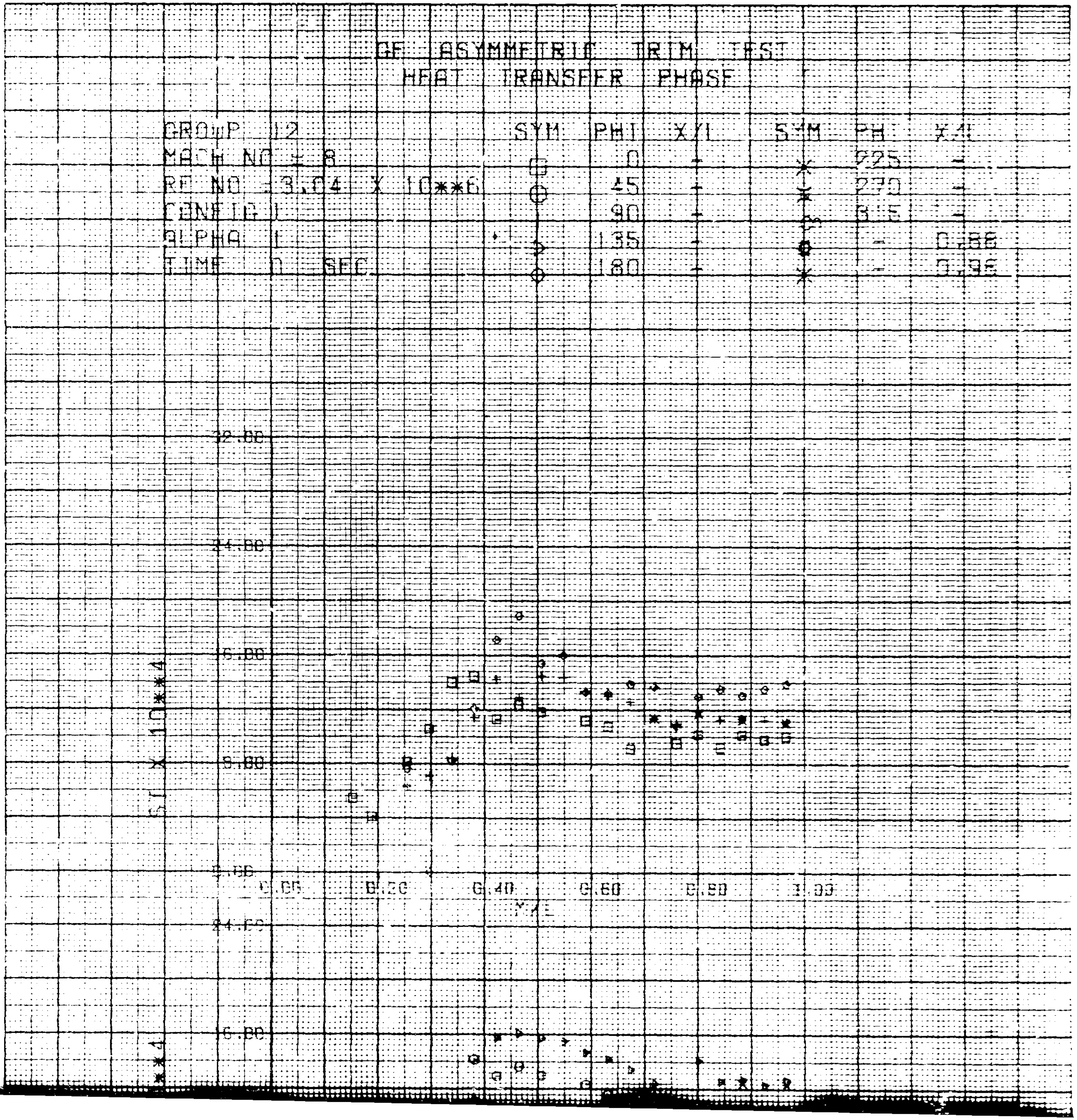
Figure 11

```
                                            7/14/69

                              AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
                               VON KARMAN GAS DYNAMICS FACILITY
                                 50 INCH HYPERSONIC TUNNEL B
                                         VT0947-B00
                                     ALPHA-S      ROLL    ALP-P    DATE      MACH NO        PO           TO         TIME
GROUP   CONFIG     ALPHA-M      BETA-M                                                                              .00
 12        XJ         1.04          0        1.04           0        0       714        8.00         669.67      1308.07
   T-INF          P-INF        Q-INF        V-INF        RHO-INF       MU-INF         RE/FT         RE/IN         MU
 9.4787E 01   4.0593E-02   3.0729E 00   3.8145E 03   4.6714E-05   7.9313E-08   1.0319E 06   2.7056E 06   3.2030E 02

TC NO   X/L     PHI     TEMP      SLOPE        Q-BTUH        HT           HM           HW           ST

  1    .1900     0     469.06   3.9999E 00   8.4113E-01   1.0035E-03   4.0944E-03   1.1297E 02   5.4303E-04
  2    .1867     0     479.19   2.4723E 00   6.1080E-01   7.5714E-04   3.0541E-03   1.1512E 02   4.1032E-04
  3    .2524     0     482.05   3.1961E 00   1.2405E 00   1.5028E-03   6.0675E-03   1.1589E 02   8.1386E-04
  4    .2943     0     489.10   5.0701E 00   1.6003E 00   1.9540E-03   7.8848E-03   1.1742E 02   1.0579E-03
  5    .3363     0     495.60   6.4613E 00   2.1025E 00   2.5874E-03   1.0440E-02   1.1893E 02   1.4003E-03
  6    .3783     0     500.54   7.1797E 00   2.1582E 00   2.6727E-03   1.0781E-02   1.2011E 02   1.4460E-03
  7    .4203     0     501.46   5.8185E 00   1.6906E 00   2.0960E-03   8.4540E-03   1.2035E 02   1.1340E-03
  8    .4623     0     506.09   6.6581E 00   1.8365E 00   2.2892E-03   9.2306E-03   1.2159E 02   1.2381E-03
  9    .5043     0     508.58   6.4714E 00   1.7504E 00   2.1899E-03   8.8243E-03   1.2204E 02   1.1843E-03
 10    .5463     0     531.79   3.4849E-02   9.7920E-01   1.2613E-03   5.0742E-03   1.2756E 02   6.8129E-04
 11    .5882     0     514.40   5.4632E 00   1.6430E 00   2.0702E-03   8.3441E-03   1.2342E 02   1.1192E-03
 12    .6302     0     518.44   5.8204E 00   1.5744E 00   1.9953E-03   8.0365E-03   1.2438E 02   1.0780E-03
 13    .6722     0     529.18   5.3469E 00   1.3144E 00   1.6874E-03   6.7965E-03   1.2693E 02   9.1164E-04
 14    .8822   315.0   534.01   3.4276E 00   9.9704E-01   1.2491E-03   5.1902E-03   1.2822E 02   6.7618E-04
 15    .7583     0     527.40   5.7133E 00   1.3784E 00   1.7663E-03   7.1142E-03   1.2652E 02   9.5429E-04
 16    .7996     0     526.09   5.2503E 00   1.4731E 00   1.8858E-03   7.5956E-03   1.2638E 02   1.0188E-03
 17    .8409     0     526.91   5.2124E 00   1.3319E 00   1.7050E-03   6.8677E-03   1.2639E 02   9.2119E-04
 18    .8822     0     530.29   5.4314E 00   1.4803E 00   1.8782E-03   7.5617E-03   1.2718E 02   1.0146E-03
 19    .9235     0     532.47   5.6048E 00   1.4041E 00   1.8103E-03   7.2842E-03   1.2770E 02   9.7773E-04
 20    .9648     0     539.02   5.9345E 00   1.4271E 00   1.8557E-03   7.4696E-03   1.2927E 02   1.0019E-03
 21    .2524    45.0   476.32   3.4948E 00   1.0331E 00   1.2421E-03   5.0167E-03   1.1439E 02   6.7291E-04
 22    .2943    45.0   479.74   3.4715E 00   1.2413E 00   1.4985E-03   6.0514E-03   1.1520E 02   8.1170E-04
 23    .3363    45.0   485.11   5.4712E 00   1.6446E 00   1.9984E-03   8.0577E-03   1.1647E 02   1.0822E-03
 24    .3783    45.0   490.75   7.1075E 00   2.1365E 00   2.6140E-03   1.0550E-02   1.1781E 02   1.4151E-03
 25    .4203    45.0   494.77   6.4982E 00   1.9482E 00   2.3929E-03   9.6550E-03   1.1875E 02   1.2951E-03
 26    .4623    45.0   500.76   7.2770E 00   2.0414E 00   2.5291E-03   1.0201E-02   1.2018E 02   1.3683E-03
 27    .5043    45.0   504.91   7.2712E 00   1.9339E 00   2.4041E-03   9.6949E-03   1.2116E 02   1.3004E-03
100    .9648   315.0   545.29   5.7527E 00   1.3834E 00   1.8136E-03   7.2977E-03   1.3076E 02   9.7887E-04
 29    .5882    45.0   509.89   6.4963E 00   1.8175E 00   2.2770E-03   9.1800E-03   1.2234E 02   1.2314E-03
 30    .6302    45.0   514.59   6.2990E 00   1.7041E 00   2.1477E-03   8.6563E-03   1.2346E 02   1.1611E-03
 31    .6722    45.0   529.97   6.4410E 00   1.6302E 0    2.0951E-03   8.4372E-03   1.2711E 02   1.1317E-03
 32    .7170    45.0   533.13   6.1025E 00   1.5030E 00   1.9395E-03   7.8045E-03   1.2787E 02   1.0475E-03
 33    .7583    45.0   524.44   5.7360E 00   1.5806E 00   2.0170E-03   8.1242E-03   1.2580E 02   1.0899E-03
 34    .7996    45.0   524.02   5.4916E 00   1.5408E 00   1.9652E-03   7.9169E-03   1.2570E 02   1.0619E-03
 35    .8409    45.0   526.61   5.4005E 00   1.4681E 00   1.9038E-03   7.6645E-03   1.2627E 02   1.0286E-03
 36    .8822    45.0   528.39   5.5038E 00   1.4476E 00   1.8567E-03   7.4779E-03   1.2674E 02   1.0030E-03
 37    .9235    45.0   531.27   5.4453E 00   1.4624E 00   1.8568E-03   7.4771E-03   1.2741E 02   1.0029E-03
 38    .9648    45.0   538.94   5.6022E 00   1.3472E 00   1.7517E-03   7.0510E-03   1.2926E 02   9.4578E-04
 39    .2524    90.0   476.17   3.7605E 00   9.6383E-01   1.1586E-03   4.6706E-03   1.1436E 02   6.2769E-04
 40    .2943    90.0   478.06   3.7921E 00   1.0876E 00   1.3104E-03   5.2920E-03   1.1481E 02   7.0983E-04
 41    .3363    90.0   482.95   4.3657E 00   1.2898E 00   1.5629E-03   6.3102E-03   1.1596E 02   8.4641E-04
 42    .3783    90.0   488.98   5.4946E 00   1.7343E 00   2.1173E-03   8.5458E-03   1.1739E 02   1.1463E-03
 43    .4203    90.0   495.45   7.5466E 00   2.1422E 00   2.6369E-03   1.0636E-02   1.1891E 02   1.4266E-03
 44    .4623    90.0   497.21   6.2197E 00   1.9321E 00   2.3828E-03   9.6129E-03   1.1934E 02   1.2894E-03
 45    .5043    90.0   503.49   7.4328E 00   2.1582E 00   2.6824E-03   1.0818E-02   1.2043E 02   1.4510E-03
 46    .5463    90.0   507.99   7.4531E 00   2.1284E 00   2.6601E-03   1.0775E-02   1.2189E 02   1.4387E-03
 47    .5882    90.0   509.59   7.0385E 00   1.9749E 00   2.4733E-03   9.9714E-03   1.2228E 02   1.3375E-03
 48    .6302    90.0   513.59   6.9369E 00   1.9113E 00   2.4058E-03   9.6971E-03   1.2322E 02   1.3007E-03
 49    .6722    90.0   529.16   7.2397E 00   1.8137E 00   2.3285E-03   9.3778E-03   1.2692E 02   1.2579E-03
 50    .7170    90.0   532.98   6.9317E 00   1.6323E 00   2.1060E-03   8.4794E-03   1.2783E 02   1.1374E-03
 51    .7583    90.0   521.67   6.1533E 00   1.6029E 00   2.0383E-03   8.2124E-03   1.2514E 02   1.1016E-03
 52    .7996    90.0   522.07   6.4541E 00   1.7334E 00   2.2054E-03   8.8852E-03   1.2524E 02   1.1918E-03
 53    .8409    90.0   523.81   6.5420E 00   1.6389E 00   2.0892E-03   8.4166E-03   1.2560E 02   1.1290E-03
 54    .8822    90.0   526.03   6.7126E 00   1.6477E 00   2.1070E-03   8.4870E-03   1.2618E 02   1.1384E-03
 55    .9235    90.0   528.23   6.7529E 00   1.6239E 00   2.0826E-03   8.3877E-03   1.2672E 02   1.1251E-03
 56    .9648    90.0   535.04   4.5421E 00   1.5853E 00   2.0504E-03   8.2546E-03   1.2833E 02   1.1075E-03
 57    .2524   135.0   469.14   1.6369E 00   3.0592E-01   3.6500E-04   1.4747E-03   1.1289E 02   1.9701E-04
 58    .2943   135.0   473.96   4.2478E 00   1.3619E 00   1.6328E-03   6.5957E-03   1.1384E 02   8.8471E-04
 59    .3363   135.0   478.55   4.3332E 00   1.3677E 00   1.6488E-03   6.6587E-03   1.1493E 02   8.9316E-04
 60    .3783   135.0   484.88   5.5272E 00   1.7170E 00   2.0858E-03   8.4204E-03   1.1642E 02   1.1295E-03
 61    .4203   135.0   490.56   7.8311E 00   2.3841E 00   2.9163E-03   1.1770E-02   1.1776E 02   1.5787E-03
 62    .4623   135.0   495.87   8.3080E 00   2.4140E 00   2.9721E-03   1.1992E-02   1.1902E 02   1.6085E-03
 63    .5043   135.0   501.34   9.2063E 00   2.3523E 00   2.9159E-03   1.1741E-02   1.2032E 02   1.5775E-03
 64    .5463   135.0   504.27   8.4929E 00   2.3084E 00   2.8719E-03   1.1582E-02   1.2101E 02   1.5535E-03
 65    .5882   135.0   507.87   8.1790E 00   2.1719E 00   2.7142E-03   1.0944E-02   1.2187E 02   1.4679E-03
 66    .6302   135.0   511.16   7.4908E 00   2.0956E 00   2.6294E-03   1.0600E-02   1.2265E 02   1.4218E-03
 67    .6722   135.0   527.46   8.4922E 00   1.9460E 00   2.4920E-03   1.0041E-02   1.2651E 02   1.3468E-03
 68    .7170   135.0   529.84   7.5839E 00   1.7859E 00   2.2949E-03   9.2420E-03   1.2708E 02   1.2397E-03
 69    .7583   135.0   517.64   4.9988E 00   1.4026E 00   1.7744E-03   7.1508E-03   1.2418E 02   9.5916E-04
 70    .7996   135.0   520.70   7.0577E 00   2.0507E 00   2.6045E-03   1.0494E-02   1.2491E 02   1.4076E-03
 71    .8409   135.0   523.12   6.6361E 00   1.8285E 00   2.3294E-03   9.3844E-03   1.2549E 02   1.2588E-03
 72    .8822   135.0   524.23   6.4191E 00   1.8448E 00   2.3536E-03   9.4813E-03   1.2575E 02   1.2718E-03
 73    .9235   135.0   527.01   7.2270E 00   1.7740E 00   2.2713E-03   9.1484E-03   1.2651E 02   1.2271E-03
 74    .9648   135.0   536.01   7.5276E 00   1.8102E 00   2.3447E-03   9.4394E-03   1.2855E 02   1.2661E-03
 75    .2524   180.0   474.95   4.0577E 00   1.1790E 00   1.4152E-03   5.7161E-03   1.1407E 02   7.6673E-04
 76    .2943   180.0  1033.52   1.4862E-06   4.7652E-07   1.7356E-09   6.5015E-09   2.5029E 02   9.1258E-10
 77    .3363   180.0   485.67   4.2389E 00   1.2531E 00   1.5237E-03   6.1509E-03   1.1661E 02   8.2504E-04
 78    .3783   180.0   492.51   6.0505E 00   1.8184E 00   2.2301E-03   8.9993E-03   1.1823E 02   1.2071E-03
 79    .4203   180.0   499.37   8.5582E 00   2.5594E 00   3.1649E-03   1.2767E-02   1.1985E 02   1.7125E-03
 80    .4623   180.0   505.33   9.8139E 00   2.9025E 00   3.4913E-03   1.4079E-02   1.2126E 02   1.8884E-03
 81    .5043   180.0   509.36   9.0755E 00   2.2736E 00   2.8466E-03   1.1477E-02   1.2222E 02   1.5394E-03
 82    .5463   180.0   512.40   8.4738E 00   2.3564E 00   2.9616E-03   1.1938E-02   1.2294E 02   1.6013E-03
 83    .5882   180.0   514.56   7.3511E 00   1.9521E 00   2.4601E-03   9.9154E-03   1.2345E 02   1.3300E-03
 84    .6302   180.0   519.44   7.2558E 00   1.9268E 00   2.4432E-03   9.8448E-03   1.2461E 02   1.3205E-03
 85    .6722   180.0   535.01   8.7723E 00   1.9893E 00   2.5733E-03   1.0340E-02   1.2831E 02   1.3897E-03
 86    .7170   180.0   538.38   8.2773E 00   1.9492E 00   2.5325E-03   1.0194E-02   1.2912E 02   1.3674E-03
 87    .7583   180.0   526.91   6.4917E 00   1.5611E 00   1.9985E-03   8.0406E-03   1.2639E 02   1.0797E-03
 88    .7996   180.0   529.01   7.1794E 00   1.8704E 00   2.4026E-03   9.6760E-03   1.2703E 02   1.2979E-03
 89    .8409   180.0   531.34   7.6249E 00   1.9462E 00   2.5083E-03   1.0101E-02   1.2744E 02   1.3548E-03
 90    .8822   180.0   533.29   8.1280E 00   1.8712E 00   2.4151E-03   9.7243E-03   1.2791E 02   1.3044E-03
 91    .9235   180.0   536.07   7.8872E 00   1.9361E 00   2.5079E-03   1.0096E-02   1.2857E 02   1.3543E-03
 92    .9648   180.0   543.37   8.5415E 00   1.9683E 00   2.5740E-03   1.0358E-02   1.3030E 02   1.3896E-03
 93    .8822   225.0   535.41   6.9429E 00   1.7740E 00   2.2959E-03   9.2414E-03   1.2841E 02   1.2398E-03
 94    .9648   225.0   544.54   7.2605E 00   1.7412E 00   2.2805E-03   9.1765E-03   1.3058E 02   1.2309E-03
 95    .7170   270.0   543.58   7.1312E 00   1.6077E 00   2.1030E-03   8.4630E-03   1.3035E 02   1.1352E-03
 96    .7996   270.0   538.55   6.2884E 00   1.6699E 00   2.1700E-03   8.7350E-03   1.2916E 02   1.1717E-03
 97    .8822   270.0   540.79   6.7882E 00   1.6087E 00   2.0968E-03   8.4280E-03   1.2969E 02   1.1305E-03
 98    .9648   270.0   546.79   6.4780E 00   1.5578E 00   2.0463E-03   8.2314E-03   1.3112E 02   1.1044E-03
```

GROUP 12 OF ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

SYM PHI X/L SYM PH[illegible] X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 12
MACH NO = 8
RE NO = 3.04 X 10**6
CONFIG 1
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.95
32.00
24.00
16.00
8.00
0.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
ST X 10**4

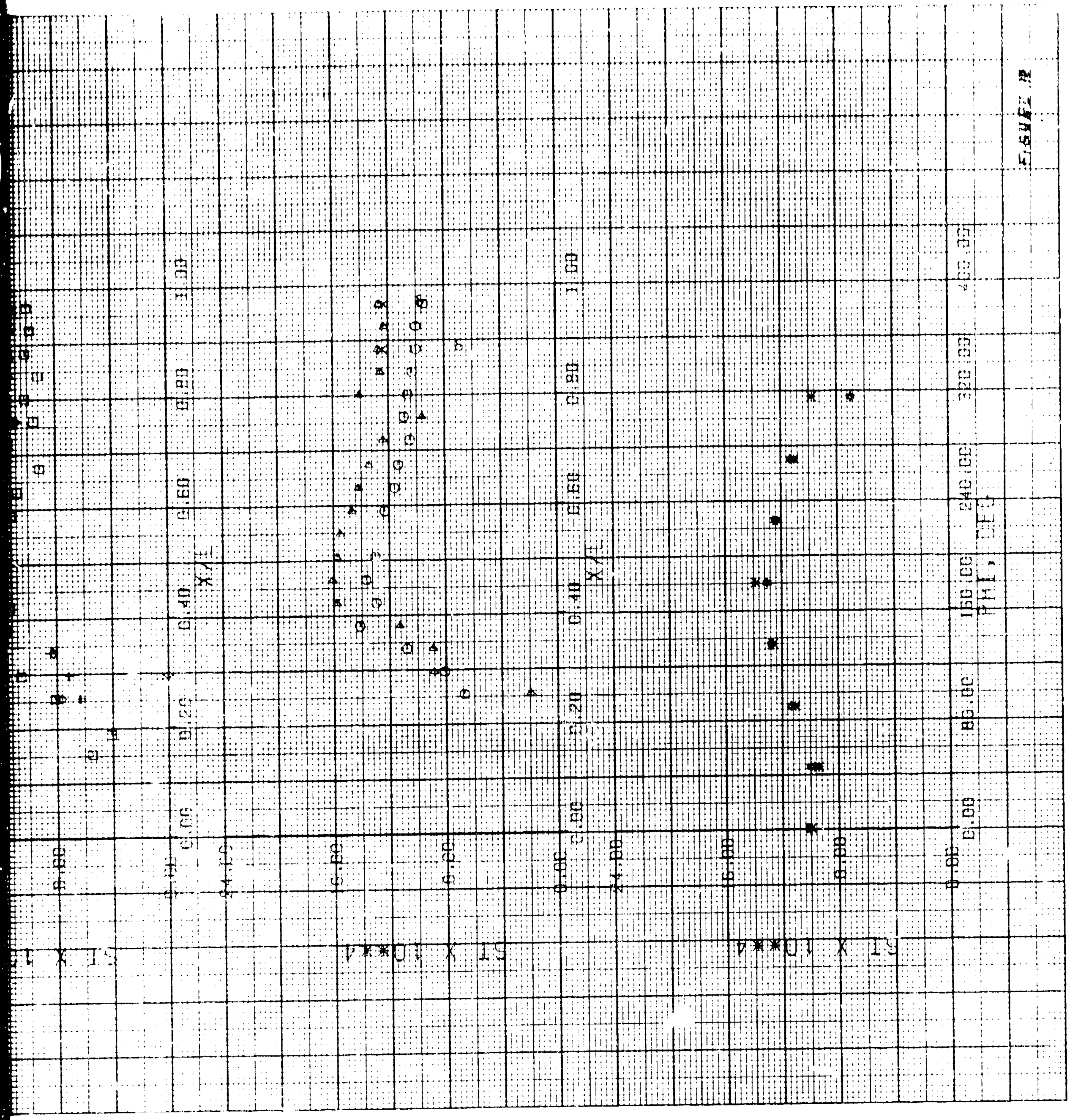
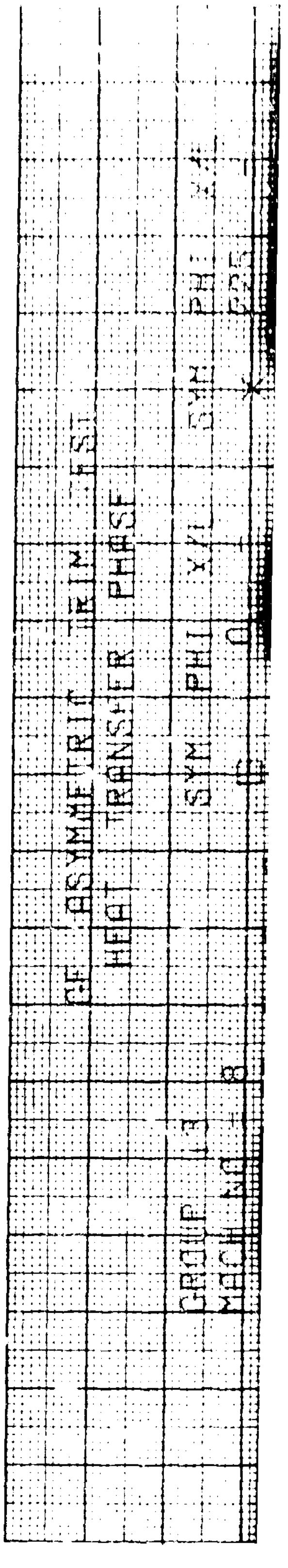
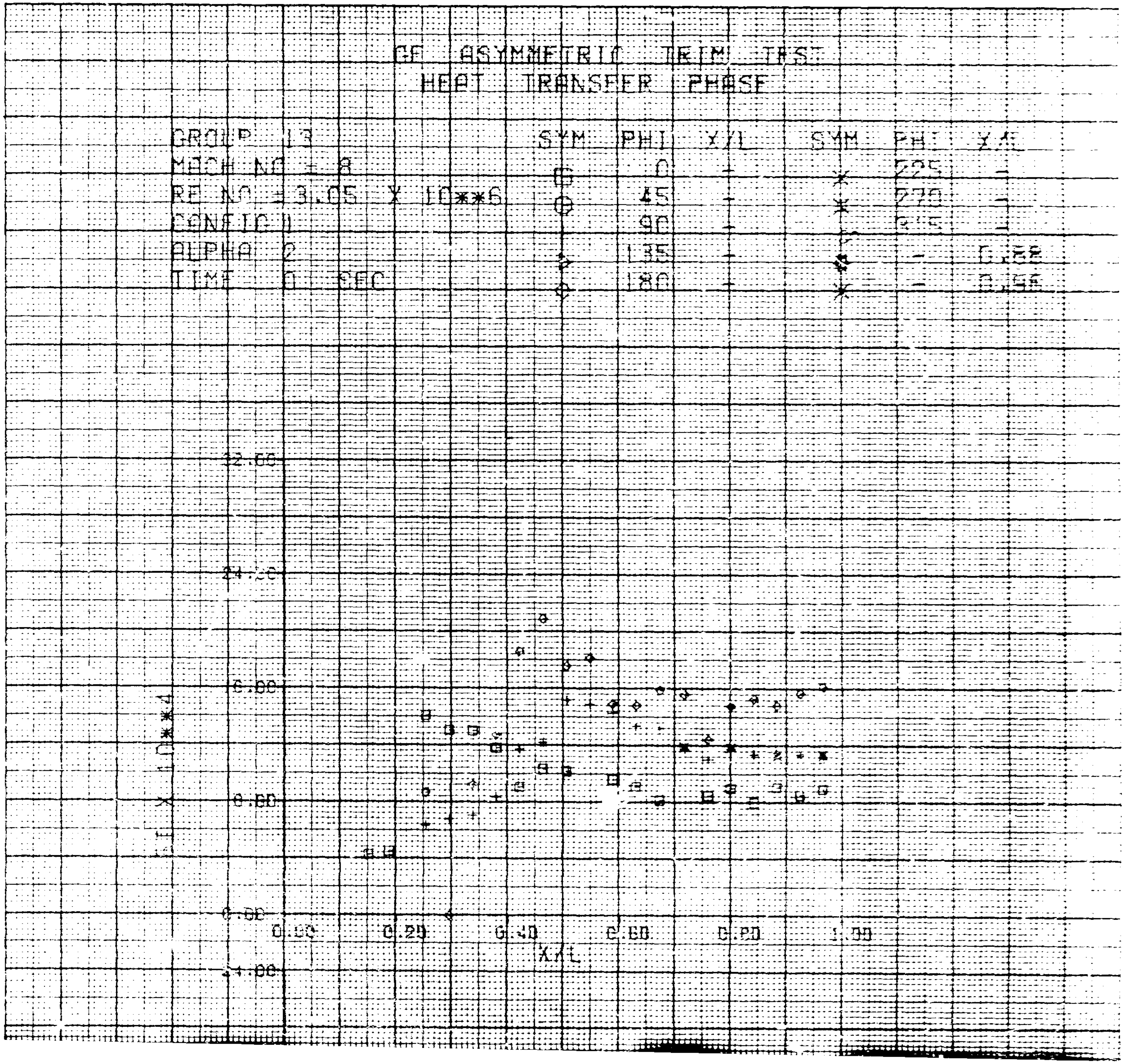

X/L
0.00
0.20
0.40
0.60
0.80
1.00
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
0.00
8.00
16.00
24.00
X 10**4

Figure 12

3

```
                                   7/16/69

                    AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                     VON KARMAN GAS DYNAMICS FACILITY
                       50 INCH HYPERSONIC TUNNEL B
                              V10967-000
GROUP  CONFIG    ALPHA-M      BETA-M       ALPHA-S      ROLL   ALP-P   DATE     MACH NO        PO          TO           TIME
 13   [illegible]  2.67          0           2.57          0      0     716       8.00       674.27     1309.93          .00
   T-INF       P-INF        Q-INF        V-INF        RHO-INF       MU-INF        RE/FT        RE/IN         HO
 9.4922E 01  6.9465E-02  3.0941E 00  3.0127E 03  [illegible]E-05  7.6422E-08  3.0590E 06  2.7964E 05  3.2683E 02

TC NO   X/L     PHI     TEMP     SLOPE        Q-STOW       HT          HM          HW          QI

   1  .1909      0    409.78  1.0810E 00  6.8971E-01  7.9897E-04  3.2190E-03  1.1275E 02  4.2924E-04
   2  .1047      0    470.89  1.1913E 00  7.0040E-01  8.4113E-04  3.3974E-03  1.1493E 02  4.5295E-04
   3  .2524      0    489.65  7.2645E 00  2.1534E 00  2.6245E-03  1.0591E-02  1.1750E 02  1.4120E-03
   4  .2943      0    497.77  [illegible]  1.9776E 00  2.4150E-03  9.8272E-03  1.1947E 02  1.3094E-03
   5  .3363      0    501.77  6.2133E 00  1.9611E 00  2.4266E-03  9.7865E-03  1.2042E 02  1.3047E-03
   6  .3783      0    503.70  5.9134E 00  [illegible]  2.2056E-03  8.8939E-03  1.2090E 02  1.1857E-03
   7  .4203      0    503.27  4.4871E 00  1.3613E 00  1.6883E-03  6.8083E-03  1.2078E 02  9.0764E-04
   8  .4623      0    506.67  5.6234E 00  1.5495E 00  1.9291E-03  7.7777E-03  1.2158E 02  1.0369E-03
   9  .5043      0    507.56  5.4241E 00  1.5215E 00  1.8962E-03  7.6447E-03  1.2170E 02  1.0191E-03
  10  .5463      0    530.36 -2.4450E-02 -6.8601E-03 -8.7999E-06 -3.5439E-05  1.2721E 02 -4.7238E-06
  11  .5882      0    511.35  5.2801E 00  1.4324E 00  1.7942E-03  7.2320E-03  1.2269E 02  9.6411E-04
  12  .6302      0    513.41  5.0143E 00  1.3566E 00  1.7025E-03  6.8620E-03  1.2311E 02  9.1479E-04
  13  .6722      0    520.89  4.7999E 00  1.2025E 00  1.5240E-03  6.1347E-03  1.2496E 02  8.1850E-04
  99  .8822    315.0  530.15  3.4710E 00  9.5550E-01  1.2267E-03  4.9395E-03  1.2717E 02  6.5850E-04
  15  .7583      0    520.29  5.1954E 00  1.2595E 00  1.5823E-03  6.3751E-03  1.2481E 02  8.4989E-04
  16  .7996      0    521.28  4.7076E 00  1.3209E 00  1.6748E-03  6.7473E-03  1.2505E 02  8.9950E-04
  17  .8409      0    521.67  4.4150E 00  1.1793E 00  1.4950E-03  6.0229E-03  1.2500E 02  8.0292E-04
  18  .8822      0    523.68  4.9022E 00  1.3243E 00  1.6894E-03  6.8053E-03  1.2562E 02  9.0723E-04
  19  .9235      0    524.81  4.9722E 00  1.2450E 00  1.5858E-03  6.3874E-03  1.2579E 02  8.5152E-04
  20  .9648      0    530.50  5.4267E 00  1.3050E 00  1.6743E-03  6.7419E-03  1.2724E 02  8.9878E-04
  21  .2524    45.0   469.97  3.7980E 00  1.1227E 00  1.3366E-03  5.3990E-03  1.1269E 02  7.1988E-04
  22  .2943    45.0   473.76  4.8035E 00  1.5401E 00  1.8419E-03  7.4394E-03  1.1379E 02  9.9177E-04
  23  .3363    45.0   479.11  6.4860E 00  1.9257E 00  2.3179E-03  9.3593E-03  1.1506E 02  1.2477E-03
  24  .3783    45.0   484.49  7.8850E 00  2.1294E 00  2.5801E-03  1.0415E-02  1.1533E 02  1.3885E-03
  25  .4203    45.0   488.50  6.7314E 00  1.8706E 00  2.1988E-03  8.8751E-03  1.1680E 02  1.1832E-03
  26  .4623    45.0   492.50  6.4904E 00  1.8773E 00  2.2966E-03  9.2558E-03  1.1822E 02  1.2356E-03
  27  .5043    45.0   496.60  6.8031E 00  1.8086E 00  2.2212E-03  [illegible]  1.1919E 02  1.1945E-03
 100  .9648   315.0   538.34  5.6722E 00  1.3160E 00  1.7055E-03  6.8646E-03  1.2911E 02  9.1514E-04
  29  .5882    45.0   501.01  6.1883E 00  1.7053E 00  2.1079E-03  8.5013E-03  1.2024E 02  1.1333E-03
  30  .6302    45.0   503.64  5.9154E 00  1.6013E 00  1.9860E-03  8.0045E-03  1.2046E 02  1.0676E-03
  31  .6722    45.0   515.28  6.4560E 00  1.5833E 00  1.9924E-03  8.0294E-03  1.2302E 02  1.0784E-03
  32  .7170    45.0   520.67  6.2058E 00  1.4614E 00  1.8515E-03  7.4594E-03  1.2489E 02  9.9446E-04
  33  .7583    45.0   513.07  5.4127E 00  1.4914E 00  1.8714E-03  7.5428E-03  1.2309E 02  1.0056E-03
  34  .7996    45.0   514.22  5.2329E 00  1.4682E 00  1.8452E-03  7.4365E-03  1.2337E 02  9.9139E-04
  35  .8409    45.0   516.82  5.2497E 00  1.4202E 00  1.7897E-03  7.2160E-03  1.2399E 02  9.6199E-04
  36  .8822    45.0   518.91  5.2340E 00  1.3769E 00  1.7407E-03  7.0135E-03  1.2449E 02  9.3498E-04
  37  .9235    45.0   520.25  5.4244E 00  1.3640E 00  1.7551E-03  7.0712E-03  1.2486E 02  9.4269E-04
  38  .9648    45.0   527.01  5.2814E 00  1.2701E 00  1.6235E-03  6.5382E-03  1.2655E 02  8.7163E-04
  39  .2524    90.0   459.13  3.9917E 00  1.0026E 00  1.1785E-03  4.7637E-03  1.1034E 02  6.3506E-04
  40  .2943    90.0   458.05  3.1648E 00  1.0795E 00  1.2671E-03  5.1275E-03  1.1008E 02  6.8289E-04
  41  .3363    90.0   464.76  3.5218E 00  1.1116E 00  1.3152E-03  5.3150E-03  1.1167E 02  7.0855E-04
  42  .3783    90.0   471.17  4.1353E 00  1.3052E 00  1.5561E-03  6.2863E-03  1.1318E 02  8.3806E-04
  43  .4203    90.0   477.71  6.1473E 00  1.8172E 00  2.1836E-03  8.8177E-03  1.1472E 02  1.1759E-03
  44  .4623    90.0   482.56  6.6030E 00  1.8834E 00  2.2764E-03  9.1901E-03  1.1587E 02  1.2252E-03
  45  .5043    90.0   490.58  8.4053E 00  2.3159E 00  2.8264E-03  1.1406E-02  1.1776E 02  1.5209E-03
  46  .5463    90.0   493.80  7.9264E 00  2.2637E 00  2.7737E-03  1.1191E-02  1.1853E 02  1.4919E-03
  47  .5882    90.0   497.93  7.7021E 00  2.1611E 00  2.6614E-03  1.0736E-02  1.1951E 02  1.4312E-03
  48  .6302    90.0   500.30  7.3271E 00  2.0188E 00  2.4936E-03  1.0057E-02  1.2007E 02  1.3407E-03
  49  .6722    90.0   510.94  7.8551E 00  1.9679E 00  2.4631E-03  9.9283E-03  1.2261E 02  1.3236E-03
  50  .7170    90.0   518.47  7.3778E 00  1.7374E 00  2.1952E-03  8.8450E-03  1.2438E 02  1.1792E-03
  51  .7583    90.0   508.65  6.3280E 00  1.6485E 00  2.0573E-03  8.2938E-03  1.2205E 02  1.1057E-03
  52  .7996    90.0   511.36  6.7427E 00  1.7565E 00  2.1995E-03  8.8660E-03  1.2269E 02  1.1819E-03
  53  .8409    90.0   513.21  6.7599E 00  1.6935E 00  2.1256E-03  8.5670E-03  1.2313E 02  1.1421E-03
  54  .8822    90.0   516.18  6.9668E 00  1.7101E 00  2.1545E-03  8.6822E-03  1.2384E 02  1.1574E-03
  55  .9235    90.0   517.76  6.9941E 00  1.6819E 00  2.1232E-03  8.5553E-03  1.2421E 02  1.1405E-03
  56  .9648    90.0   524.14  6.8518E 00  1.6477E 00  2.0969E-03  8.4465E-03  1.2573E 02  1.1260E-03
  57  .2524   135.0   450.47  1.1107E 00  3.2836E-01  3.8204E-04  1.5450E-03  1.0829E 02  2.0597E-04
  58  .2943   135.0   454.18  4.2178E 00  1.3523E 00  1.5803E-03  6.3897E-03  1.0917E 02  8.5183E-04
  59  .3363   135.0   461.52  4.4893E 00  1.4170E 00  1.6701E-03  6.7504E-03  1.1090E 02  8.9991E-04
  60  .3783   135.0   470.76  5.1599E 00  1.6650E 00  1.9841E-03  8.0152E-03  1.1308E 02  1.0685E-03
  61  .4203   135.0   478.96  7.7381E 00  2.3261E 00  2.7925E-03  1.1277E-02  1.1455E 02  1.5034E-03
  62  .4623   135.0   484.18  [illegible]  2.5587E 00  3.0986E-03  1.2508E-02  1.1625E 02  1.6675E-03
  63  .5043   135.0   490.89  1.0230E 01  2.6139E 00  3.1914E-03  1.2878E-02  1.1784E 02  1.7168E-03
  64  .5463   135.0   494.57  9.7841E 00  2.5942E 00  3.1863E-03  1.2855E-02  1.1870E 02  1.7138E-03
  65  .5882   135.0   498.87  8.9653E 00  2.3807E 00  2.9353E-03  1.1840E-02  1.1973E 02  1.5784E-03
  66  .6302   135.0   500.66  8.9320E 00  2.3719E 00  2.9309E-03  1.1821E-02  1.2016E 02  1.5759E-03
  67  .6722   135.0   512.96  9.1905E 00  2.2101E 00  2.7730E-03  1.1176E-02  1.2306E 02  1.4900E-03
  68  .7170   135.0   518.71  8.6774E 00  2.0434E 00  2.5826E-03  1.0406E-02  1.2444E 02  1.3873E-03
  69  .7583   135.0   507.70  5.7059E 00  1.6290E 00  2.0306E-03  8.1866E-03  1.2182E 02  1.0914E-03
  70  .7996   135.0   514.06  7.4040E 00  2.1687E 00  2.7250E-03  1.0982E-02  1.2333E 02  1.4641E-03
  71  .8409   135.0   516.47  7.3989E 00  2.0386E 00  2.5693E-03  1.0353E-02  1.2391E 02  1.3802E-03
  72  .8822   135.0   518.54  7.7729E 00  2.1029E 00  2.6572E-03  1.0707E-02  1.2440E 02  1.4273E-03
  73  .9235   135.0   521.14  8.8452E 00  1.9769E 00  2.5037E-03  1.0087E-02  1.2502E 02  1.3447E-03
  74  .9648   135.0   527.08  8.6235E 00  2.0738E 00  2.6490E-03  1.0669E-02  1.2643E 02  1.4223E-03
  75  .2524   180.0   458.01  4.7193E 00  1.3712E 00  1.6096E-03  6.5068E-03  1.1007E 02  8.6744E-04
  76  .2943   180.0  -116.76  6.1927E-08  1.9855E-08  1.3917E-11  5.8082E-11 -2.1036E 01  7.7431E-12
  77  .3363   180.0   469.26  4.8837E 00  1.4437E 00  1.7173E-03  6.9379E-03  1.1273E 02  9.2491E-04
  78  .3783   180.0   478.60  6.5612E 00  1.9723E 00  2.3725E-03  9.5800E-03  1.1493E 02  1.2771E-03
  79  .4203   180.0   487.51  9.6228E 00  2.8446E 00  3.4588E-03  1.3960E-02  1.1704E 02  1.8611E-03
  80  .4623   180.0   495.32  1.1092E 01  3.1676E 00  3.8885E-03  1.5688E-02  1.1889E 02  2.0914E-03
  81  .5043   180.0   499.99  1.0590E 01  2.6550E 00  3.2780E-03  1.3221E-02  1.2000E 02  1.7626E-03
  82  .5463   180.0   503.49  1.0264E 01  2.7257E 00  3.3798E-03  1.3629E-02  1.2082E 02  1.8170E-03
  83  .5882   180.0   505.04  8.4287E 00  2.2382E 00  2.7836E-03  1.1274E-02  1.2139E 02  1.4962E-03
  84  .6302   180.0   509.97  8.1250E 00  2.2109E 00  2.7638E-03  1.1141E-02  1.2236E 02  1.4853E-03
  85  .6722   180.0   522.38  9.7094E 00  2.3349E 00  2.9646E-03  1.1943E-02  1.2530E 02  1.5921E-03
  86  .7170   180.0   520.69  9.4411E 00  2.2704E 00  2.9061E-03  1.1703E-02  1.2481E 02  1.5602E-03
  87  .7583   180.0   518.10  7.6410E 00  1.8375E 00  2.3206E-03  9.3504E-03  1.2429E 02  1.2465E-03
  88  .7996   180.0   523.47  8.3201E 00  2.1674E 00  2.7559E-03  1.1101E-02  1.2557E 02  1.4799E-03
  89  .8409   180.0   525.96  8.7992E 00  2.2381E 00  2.8548E-03  1.1408E-02  1.2616E 02  1.5328E-03
  90  .8822   180.0   528.21  7.3704E 00  2.1612E 00  2.7447E-03  1.1134E-02  1.2678E 02  1.4443E-03
  91  .9235   180.0   529.01  9.7808E 00  2.2848E 00  2.9282E-03  1.1791E-02  1.2703E 02  1.5719E-03
  92  .9648   180.0   536.33  1.0119E 01  2.3319E 00  3.0143E-03  1.2134E-02  1.2803E 02  1.6176E-03
  93  .8822   225.0   528.07  7.9053E 00  2.0199E 00  2.5033E-03  1.0803E-02  1.2665E 02  1.3869E-03
  94  .9648   225.0   536.17  8.7353E 00  1.9804E 00  2.5594E-03  1.0382E-02  1.2858E 02  1.3735E-03
  95  .7170   270.0   534.90  7.4643E 00  1.7279E 00  2.2295E-03  8.9742E-03  1.2829E 02  1.1965E-03
  96  .7996   270.0   529.39  6.4092E 00  1.7205E 00  2.2145E-03  8.9175E-03  1.2698E 02  1.1888E-03
  97  .8822   270.0   530.05  6.6272E 00  1.6422E 00  2.1076E-03  8.4856E-03  1.2728E 02  1.1312E-03
  98  .9648   270.0   517.54  6.7970E 00  1.6345E 00  2.1162E-03  8.5179E-03  1.2492E 02  1.1355E-03
```




GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 13
MACH NO = 8
RE NO = 3.05 X 10**6
CONFIG 1
ALPHA 2
TIME 0 SEC
SYM PHI X/L
□ 0 -
⊕ 45 -
+ 90 -
⬦ 135 -
◇ 180 -
SYM PHI X/L
× 225 -
✳ 270 -
315 -
- 0.88
✳ - 0.56
32.00
24.00
16.00
8.00
0.00
-8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
H X 10**4

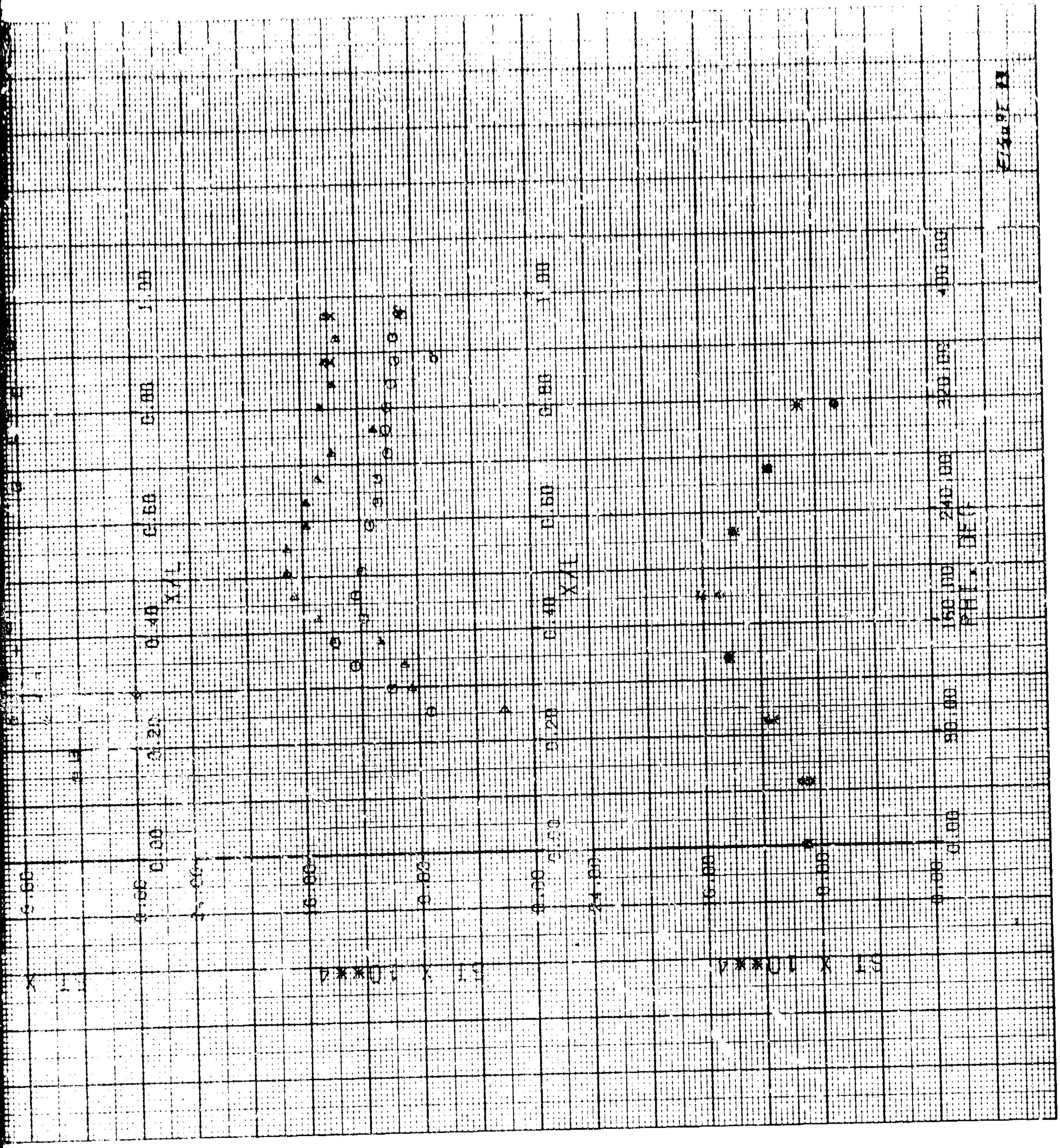


Figure 13
X/L
0.00
0.20
0.40
0.60
0.80
1.00
ST X 10**4
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
0.00
8.00
16.00
24.00

Figure 13

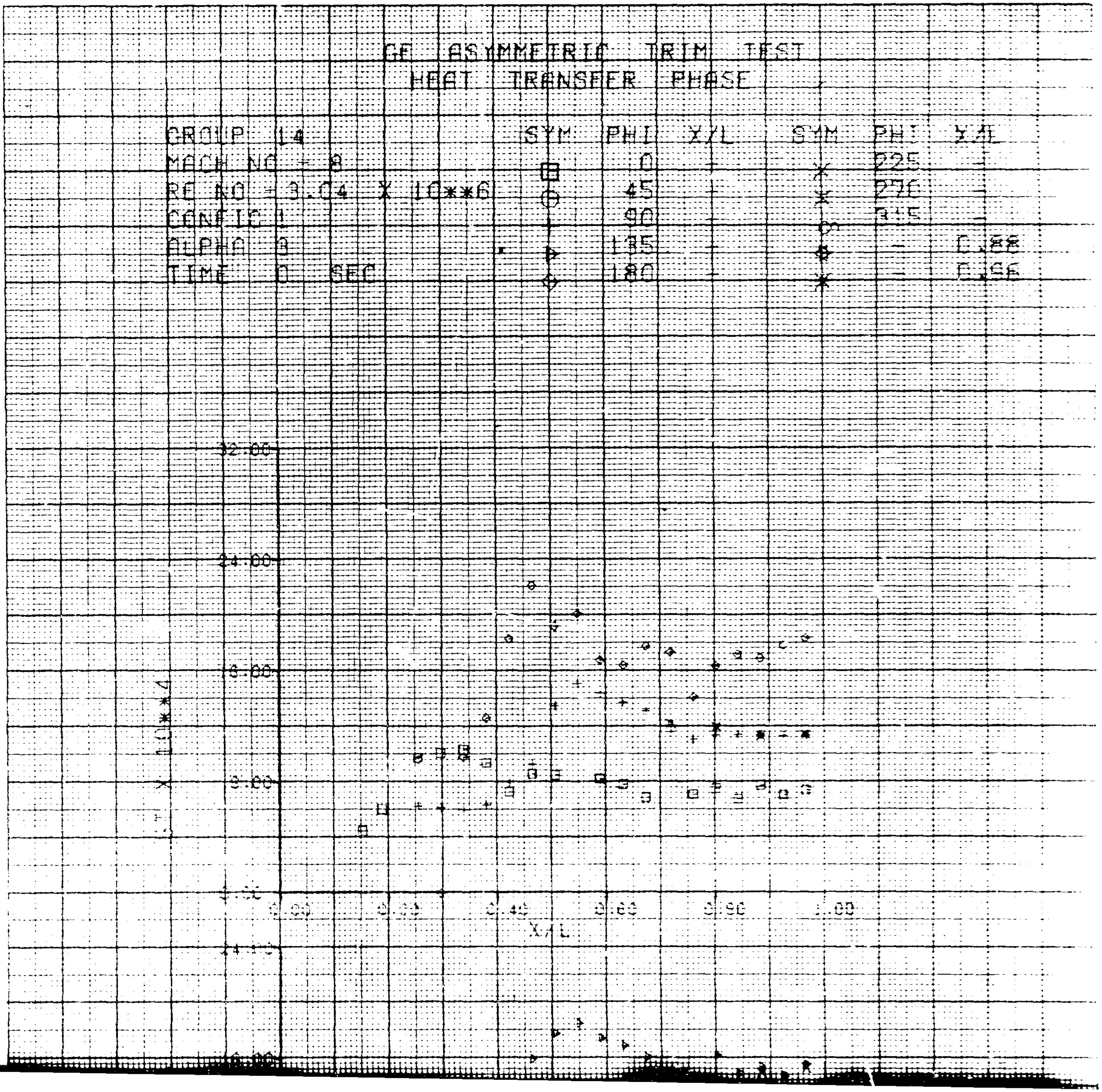
```
                              [illegible]
                 [illegible]
                 [illegible]
                 [illegible]
GROUP  CONFIG   [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  DATE   MACH NO    PO       TO      TIME
 35      [illegible]  [illegible]   [illegible]    5.10       [illegible]   [illegible]  714    8.00     611.57   1369.67    .06
 T-INF      P-INF       Q-INF       V-INF       RHO-INF      MU-INF      RE/FT       RE/IN       MU
 [illegible]

TC NO   X/L     PHI     T-WP     SLOPE        Q-STDW        HT          HM          HW          ST

  1   [illegible]   0    [illegible]  1.1059E 00   8.8809E-01   8.3291E-04   3.3079E-03   1.1811E 02   7.5509E-04
  2    .1867      0     490.39   4.7120E 00   9.2501E-01   1.1291E-03   4.5563E-03   1.1772E 02   6.0980E-04
  3    .2524      0     511.42   4.3677E 00   1.4665E 00   1.8169E-03   7.3279E-03   1.2034E 02   9.8073E-04
  4    .2943      0     513.64   4.7437E 00   1.4971E 00   1.8809E-03   7.5809E-03   1.2123E 02   1.0146E-03
  5    .3363      0     517.21   4.9165E 00   1.5259E 00   1.9276E-03   7.7503E-03   1.2409E 02   1.0305E-03
  6    .3783      0     516.49   4.5907E 00   1.1800E 00   1.7462E-03   7.0279E-03   1.2439E 02   9.4059E-04
  7    .4203      0     517.73   1.5995E 00   1.0749E 00   1.3571E-03   5.4643E-03   1.2420E 02   7.3198E-04
  8    .4623      0     520.11   4.3658E 00   1.2580E 00   1.5953E-03   6.4196E-03   1.2477E 02   8.5915E-04
  9    .5043      0     520.22   4.5206E 00   1.2501E 00   1.5835E-03   6.3796E-03   1.2480E 02   8.5103E-04
 10    .5463      0     530.44  -4.0551E-07  -1.3903E-07  -1.7642E-10  -7.1044E-10   1.2723E 02   -.6153E-11
 11    .5882      0     523.57   4.3645E 00   1.2025E 00   1.5208E-03   6.1623E-03   1.2560E 02   8.2476E-04
 12    .6302      0     525.12   4.1175E 00   1.1410E 00   1.4541E-03   5.4578E-03   1.2596E 02   7.8399E-04
 13    .6722      0     528.04   1.9993E 00   9.9912E-01   1.2786E-03   5.1491E-03   1.2667E 02   6.8913E-04
 14    .8822    315.0   517.07   1.6553E 00   9.0012E-01   1.1650E-03   4.6846E-03   1.2880E 02   6.2764E-04
 15    .7583      0     530.15   4.3912E 00   1.0319E 00   1.3213E-03   5.3367E-03   1.2716E 02   7.1344E-04
 16    .7996      0     531.60   4.7057E 00   1.0959E 00   1.4084E-03   5.6710E-03   1.2750E 02   7.5898E-04
 17    .8409      0     531.21   4.4027E 00   9.8122E-01   1.2605E-03   5.0754E-03   1.2742E 02   6.7928E-04
 18    .8822      0     533.69   4.6001E 00   1.1173E 00   1.4373E-03   5.7971E-03   1.2800E 02   7.7586E-04
 19    .9235      0     534.81   4.3703E 00   1.0197E 00   1.3156E-03   5.2965E-03   1.2822E 02   7.0886E-04
 20    .9648      0     535.55   4.4415E 00   1.0681E 00   1.3798E-03   5.5543E-03   1.2844E 02   7.4337E-04
 21    .2524     45.0   483.94   2.6703E 00   7.7162E-01   9.3451E-04   3.7725E-03   1.1621E 02   5.0490E-04
 22    .2943     45.0   492.69   3.3767E 00   1.0504E 00   1.2857E-03   5.1878E-03   1.1827E 02   6.9431E-04
 23    .3363     45.0   496.94   4.5515E 00   1.3682E 00   1.6835E-03   6.7912E-03   1.1928E 02   9.0890E-04
 24    .3783     45.0   499.71   5.5695E 00   1.6742E 00   2.0670E-03   8.3371E-03   1.1993E 02   1.1158E-03
 25    .4203     45.0   502.04   5.5013E 00   1.6275E 00   2.0152E-03   8.1270E-03   1.2048E 02   1.0877E-03
 26    .4623     45.0   506.35   6.1196E 00   1.7170E 00   2.1374E-03   8.6190E-03   1.2151E 02   1.1534E-03
 27    .5043     45.0   508.77   6.2238E 00   1.6527E 00   2.0636E-03   8.3192E-03   1.2208E 02   1.1134E-03
100    .9648    315.0   541.94   4.4964E 00   1.1775E 00   1.5337E-03   6.1720E-03   1.2996E 02   8.2604E-04
 29    .5882     45.0   511.09   5.5636E 00   1.5329E 00   1.9215E-03   7.7450E-03   1.2282E 02   1.0366E-03
 30    .6302     45.0   513.05   5.1733E 00   1.4537E 00   1.8266E-03   7.3620E-03   1.2329E 02   9.8531E-04
 31    .6722     45.0   522.01   5.4467E 00   1.4352E 00   1.8221E-03   7.3404E-03   1.2522E 02   9.8241E-04
 32    .7170     45.0   525.95   5.4467E 00   1.3293E 00   1.6961E-03   6.8313E-03   1.2616E 02   9.1427E-04
 33    .7583     45.0   521.60   4.8364E 00   1.3326E 00   1.6909E-03   6.8121E-03   1.2513E 02   9.1171E-04
 34    .7996     45.0   523.00   4.6388E 00   1.3015E 00   1.6545E-03   6.6648E-03   1.2546E 02   8.9199E-04
 35    .8409     45.0   525.16   4.6884E 00   1.2684E 00   1.6168E-03   6.5122E-03   1.2597E 02   8.7157E-04
 36    .8822     45.0   526.56   4.5713E 00   1.2287E 00   1.5690E-03   6.3191E-03   1.2630E 02   8.4572E-04
 37    .9235     45.0   527.45   4.7955E 00   1.2253E 00   1.5664E-03   6.3086E-03   1.2652E 02   8.4431E-04
 38    .9648     45.0   532.30   4.7610E 00   1.1449E 00   1.4728E-03   5.9300E-03   1.2767E 02   7.9365E-04
 39    .2524     90.0   469.86   3.1110E 00   9.7877E-01   1.1655E-03   4.7084E-03   1.1287E 02   6.3016E-04
 40    .2943     90.0   475.70   2.9803E 00   9.5553E-01   1.1458E-03   4.6274E-03   1.1425E 02   6.1931E-04
 41    .3363     90.0   481.32   2.9337E 00   9.2596E-01   1.1178E-03   4.5132E-03   1.1558E 02   6.0403E-04
 42    .3783     90.0   486.31   3.6767E 00   9.7109E-01   1.1794E-03   4.7606E-03   1.1676E 02   6.3716E-04
 43    .4203     90.0   492.25   4.1279E 00   1.2202E 00   1.4928E-03   6.0235E-03   1.1816E 02   8.0616E-04
 44    .4623     90.0   495.49   4.5240E 00   1.4066E 00   1.7274E-03   6.9690E-03   1.1891E 02   9.3271E-04
 45    .5043     90.0   502.21   7.3450E 00   2.0234E 00   2.5063E-03   1.0108E-02   1.2052E 02   [illegible]
 46    .5463     90.0   507.34   7.3694E 00   2.2474E 00   2.8011E-03   1.1293E-02   1.2174E 02   1.5115E-03
 47    .5882     90.0   509.17   7.6389E 00   2.1433E 00   2.6775E-03   1.0794E-02   1.2217E 02   1.4446E-03
 48    .6302     90.0   510.81   7.4080E 00   2.0406E 00   2.5544E-03   1.0297E-02   1.2256E 02   1.3781E-03
 49    .6722     90.0   519.17   7.4936E 00   1.9274E 00   2.4382E-03   9.8240E-03   1.2455E 02   1.3148E-03
 50    .7170     90.0   524.62   7.2166E 00   1.6994E 00   2.1647E-03   8.7196E-03   1.2584E 02   1.1670E-03
 51    .7583     90.0   517.39   6.2597E 00   1.6306E 00   2.0581E-03   8.2934E-03   1.2413E 02   1.1100E-03
 52    .7996     90.0   520.03   6.4228E 00   1.6731E 00   2.1188E-03   8.5368E-03   1.2475E 02   1.1425E-03
 53    .8409     90.0   521.82   6.5740E 00   1.6720E 00   2.1222E-03   8.5495E-03   1.2518E 02   1.1442E-03
 54    .8822     90.0   524.20   6.7630E 00   1.6601E 00   2.1135E-03   8.5134E-03   1.2574E 02   1.1396E-03
 55    .9235     90.0   525.03   6.4644E 00   1.6507E 00   2.1039E-03   8.4739E-03   1.2594E 02   1.1341E-03
 56    .9648     90.0   529.40   6.8705E 00   1.6522E 00   2.1175E-03   8.5271E-03   1.2698E 02   1.1412E-03
 57    .2524    135.0   458.57   1.1131E 00   3.8816E-01   4.5607E-04   1.8437E-03   1.1020E 02   2.4675E-04
 58    .2943    135.0   467.44   4.3539E 00   1.3975E 00   1.6593E-03   6.7045E-03   1.1230E 02   8.9731E-04
 59    .3363    135.0   474.37   4.3273E 00   1.3658E 00   1.6351E-03   6.6044E-03   1.1394E 02   8.8390E-04
 60    .3783    135.0   481.32   4.6900E 00   1.4569E 00   1.7588E-03   7.1010E-03   1.1550E 02   9.5037E-04
 61    .4203    135.0   488.17   6.5591E 00   1.9717E 00   2.4001E-03   9.6847E-03   1.1720E 02   1.2964E-03
 62    .4623    135.0   494.66   9.7203E 00   2.4175E 00   2.9663E-03   1.1968E-02   1.1874E 02   1.6017E-03
 63    .5043    135.0   501.09   1.0466E 01   2.6742E 00   3.3072E-03   1.3339E-02   1.2026E 02   1.7852E-03
 64    .5463    135.0   504.59   1.0440E 01   2.7724E 00   3.4436E-03   1.3886E-02   1.2109E 02   1.8584E-03
 65    .5882    135.0   508.69   9.7838E 00   2.5981E 00   3.2433E-03   1.3075E-02   1.2204E 02   1.7499E-03
 66    .6302    135.0   510.17   9.4453E 00   2.5082E 00   3.1372E-03   1.2646E-02   1.2241E 02   1.6926E-03
 67    .6722    135.0   520.16   9.3150E 00   2.3603E 00   2.9896E-03   1.2045E-02   1.2478E 02   1.6120E-03
 68    .7170    135.0   524.05   9.2201E 00   2.1712E 00   2.7637E-03   1.1133E-02   1.2571E 02   1.4899E-03
 69    .7583    135.0   515.56   5.9721E 00   1.6756E 00   2.1101E-03   8.5035E-03   1.2369E 02   1.1381E-03
 70    .7996    135.0   522.07   8.1595E 00   2.3704E 00   3.0101E-03   1.2127E-02   1.2524E 02   1.6230E-03
 71    .8409    135.0   524.16   7.9072E 00   2.1787E 00   2.7736E-03   1.1172E-02   1.2573E 02   1.4952E-03
 72    .8822    135.0   525.71   8.2884E 00   2.2423E 00   2.8603E-03   1.1520E-02   1.2610E 02   1.5418E-03
 73    .9235    135.0   527.24   8.7394E 00   2.1453E 00   2.7418E-03   1.1042E-02   1.2647E 02   1.4779E-03
 74    .9648    135.0   533.37   9.1329E 00   2.2444E 00   2.8911E-03   1.1640E-02   1.2792E 02   1.5578E-03
 75    .2524    180.0   [illegible]   5.1970E 00   1.5100E 00   1.7845E-03   7.2118E-03   1.1136E 02   9.6520E-04
 76    .2943    180.0  1033.52   1.4862E-06   4.7652E-07   1.7255E-09   6.7633E-09   2.5029E 02   9.0517E-10
 77    .3363    180.0   479.74   5.1070E 00   1.5097E 00   1.8191E-03   7.3450E-03   1.1520E 02   9.8353E-04
 78    .3783    180.0   487.09   6.4102E 00   1.9269E 00   2.3425E-03   9.4547E-03   1.1696E 02   1.2654E-03
 79    .4203    180.0   496.12   9.7655E 00   2.7685E 00   3.4030E-03   1.3729E-02   1.1908E 02   1.8374E-03
 80    .4623    180.0   503.67   1.1597E 01   3.3117E 00   4.1087E-03   1.6549E-02   1.2087E 02   2.2175E-03
 81    .5043    180.    508.71   1.1427E 01   2.8626E 00   3.5740E-03   1.4408E-02   1.2207E 02   1.9284E-03
 82    .5463    180.    512.31   1.1238E 01   2.9841E 00   3.7425E-03   1.5085E-02   1.2292E 02   2.0189E-03
 83    .5882    180     514.82   9.7274E 00   2.4769E 00   3.1167E-03   1.2559E-02   1.2351E 02   1.6808E-03
 84    .6302    180.0   518.37   9.1004E 00   2.4166E 00   3.0539E-03   1.2305E-02   1.2436E 02   1.6469E-03
 85    .6722    180.0   529.30   [illegible]   2.5807E 00   3.3070E-03   1.3317E-02   1.2696E 02   1.7823E-03
 86    .7170    180.0   533.99   1.0616E 01   2.5001E 00   [illegible]   1.2976E-02   1.2807E 02   1.7366E-03
 87    .7583    180.0   524.88   8.5792E 00   2.0631E 00   [illegible]   1.0589E-02   1.2591E 02   1.4172E-03
 88    .7996    180.0   531.31   9.1066E 00   2.3723E 00   3.0478E-03   1.2272E-02   1.2743E 02   1.6424E-03
 89    .8409    180.0   533.29   9.7020E 00   2.4793E 00   3.1929E-03   1.2855E-02   1.2790E 02   1.7205E-03
 90    .8822    180.0   535.26   1.0551E 01   2.4314E 00   3.1396E-03   1.2639E-02   1.2837E 02   1.6916E-03
 91    .9235    180.0   538.92   1.1429E 01   2.5591E 00   3.3120E-03   1.3332E-02   1.2879E 02   1.7843E-03
 92    .9648    180.0   541.62   1.1386E 01   2.6237E 00   3.4160E-03   1.3747E-02   1.2989E 02   1.8399E-03
 93    .8822    225.0   536.52   8.4152E 00   2.1502E 00   2.7810E-03   1.1195E-02   1.2867E 02   1.4983E-03
 94    .9648    225.0   541.98   9.3807E 00   [illegible]   2.8445E-03   1.1447E-02   1.2997E 02   1.5320E-03
 95    .7170    270.0   539.44   7.7483E 00   [illegible]   2.2680E-03   9.1280E-03   1.2937E 02   1.2217E-03
 96    .7996    270.0   538.11   6.4674E 00   [illegible]   2.2259E-03   8.9503E-03   1.2905E 02   1.1991E-03
 97    .8822    270.0   540.56   6.3377E 00   [illegible]   2.1054E-03   8.4712E-03   1.2963E 02   1.1340E-03
 98    .9648    270.0   542.88   6.7690E 00   1.6278E 00   2.1229E-03   8.5424E-03   1.3019E 02   1.1433E-03
```

CF ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

GROUP 14 SYM PHI X/L SYM PHI X/L

225


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 14
MACH NO = 8
RE NO = 3.04 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
⊟ 0 -
○ 45 -
+ 90 -
▷ 135 -
◇ 180 -
SYM PHI X/L
× 225 -
✳ 270 -
☉ 315 -
✦ - 0.88
✶ - 0.96
32.00
24.00
16.00
8.00
0.00
-8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
X 10**4

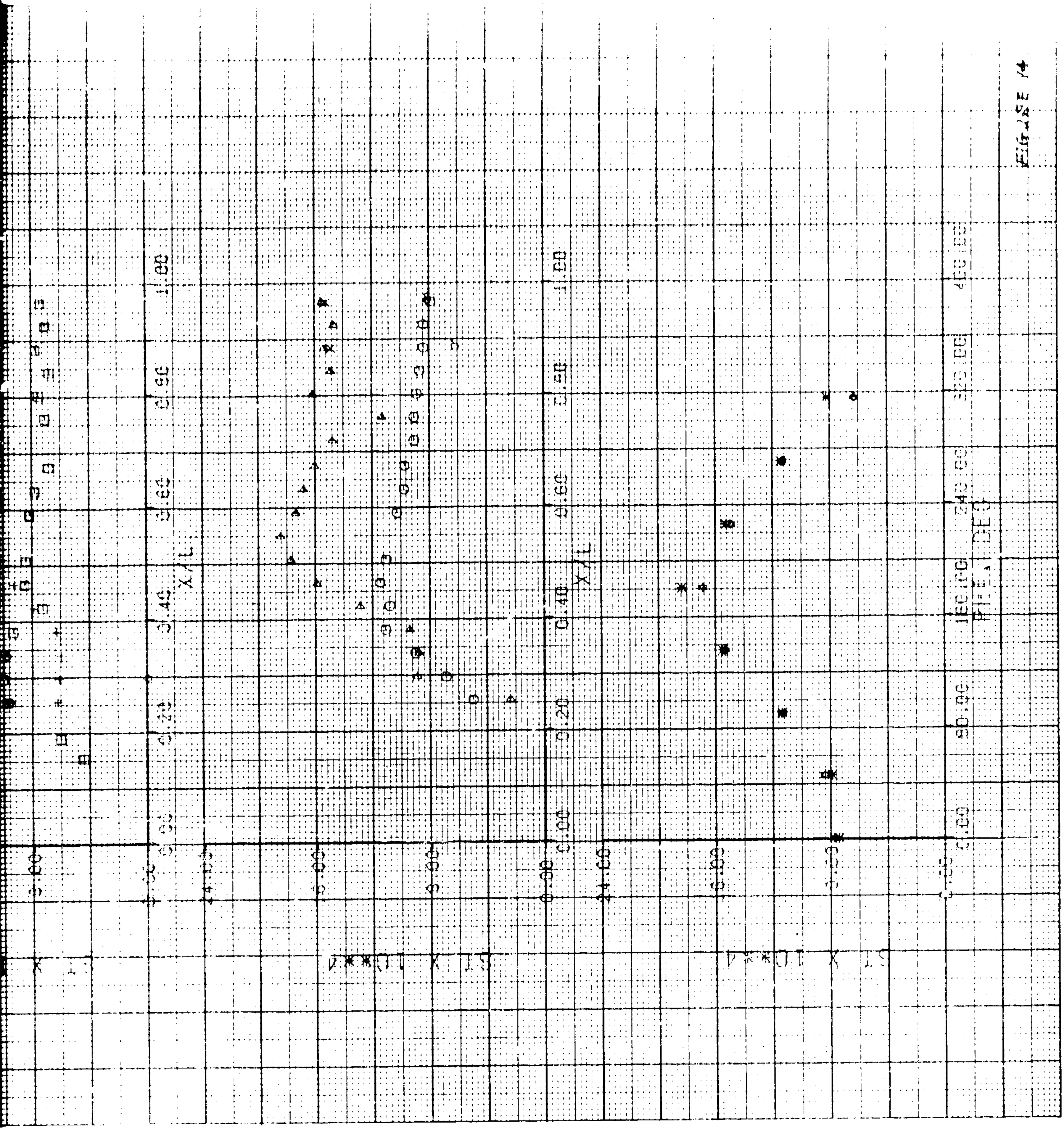


FIGURE 14
X/L
X/L
PHI, DEG
0.00
0.20
0.40
0.60
0.80
1.00
0.00
0.20
0.40
0.60
0.80
1.00
0.00
90.00
180.00
270.00
360.00
ST X 10**4
ST X 10**4

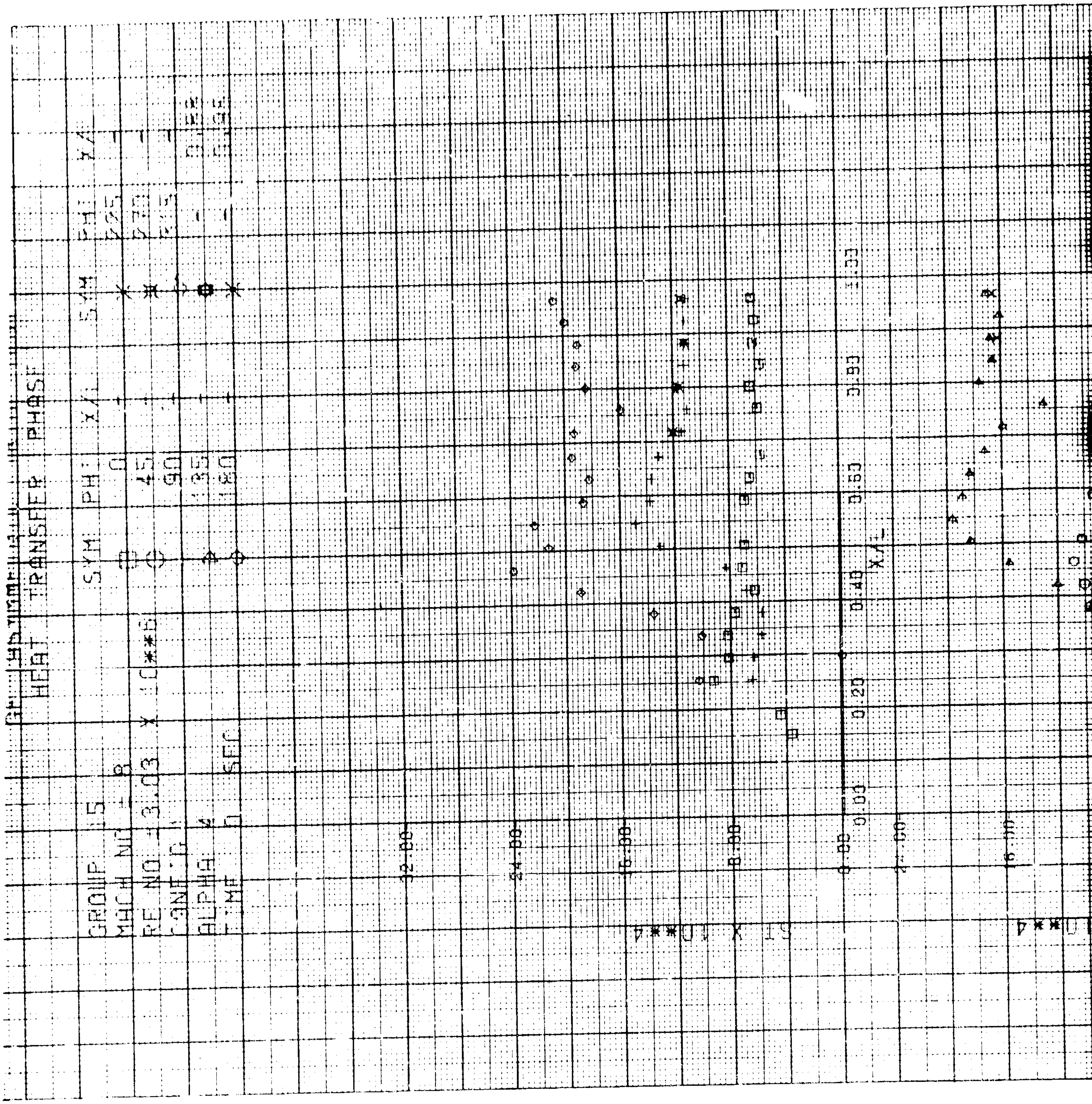
Figure 14

[illegible]

TC NO	X/L	PHI	T-W	SLOPE	[illegible]	HT	[illegible]	[illegible]	ST
1	.1900	0	482.28	2.6022E 00	5.7870E-01	6.7928E-04	2.8212E-03	1.1980E 02	5.7871E-04
2	.1867	0	489.04	3.1577E 00	6.9161E-01	8.4482E-04	3.4045E-03	1.1751E 02	4.5737E-04
3	.2524	0	501.41	4.7823E 00	1.4137E 00	1.7491E-03	7.0542E-03	1.2030E 02	9.4628E-04
4	.2943	0	512.95	1.8814E 00	1.2251E 00	1.5313E-03	6.1962E-03	1.2307E 02	8.3119E-04
5	.3363	0	516.26	1.4910E 00	1.2281E 00	1.5478E-03	6.2313E-03	1.2386E 02	8.3670E-04
6	.3783	0	517.24	1.4354E 00	1.1530E 00	1.4548E-03	5.8623E-03	1.2410E 02	7.8439E-04
7	.4203	0	518.31	1.5167E 00	9.3464E-01	1.1779E-03	4.7445E-03	1.2387E 02	6.3672E-04
8	.4623	0	518.11	1.4573E 00	1.0628E 00	1.3423E-03	5.4047E-03	1.2430E 02	7.2555E-04
9	.5043	0	517.91	1.4464E 00	1.0407E 00	1.3142E-03	5.2954E-03	1.2425E 02	7.1035E-04
10	.5463	0	510.90	-4.7509E-02	-1.8962E-02	-2.4117E-05	-9.7915E-05	1.2736E 02	-1.3135E-05
11	.5882	0	520.81	1.7317E 00	1.0202E 00	1.3031E-03	5.2390E-03	1.2494E 02	7.0426E-04
12	.6302	0	522.06	1.5776E 00	9.6784E-01	1.2288E-03	4.9495E-03	1.2523E 02	6.6394E-04
13	.6722	0	526.96	1.1886E 00	8.4891E-01	1.0843E-03	4.3671E-03	1.2640E 02	5.8582E-04
99	.8022	315.0	531.31	1.1592E 00	8.2290E-01	1.0571E-03	4.2568E-03	1.2704E 02	5.7098E-04
15	.7583	0	525.91	1.4233E 00	8.7136E-01	1.1115E-03	4.4769E-03	1.2616E 02	6.0055E-04
16	.7996	0	527.04	1.1627E 00	9.4352E-01	1.2053E-03	4.8543E-03	1.2642E 02	6.5117E-04
17	.8409	0	526.66	[illegible]	8.3946E-01	1.0719E-03	4.3169E-03	1.2633E 02	5.7910E-04
18	.8822	0	528.81	1.4306E 00	9.0954E-01	1.1645E-03	4.6890E-03	1.2684E 02	6.2909E-04
19	.9235	0	529.31	1.5547E 00	8.9052E-01	1.1409E-03	4.5944E-03	1.2696E 02	6.1631E-04
20	.9648	0	532.86	1.4141E 00	9.1722E-01	1.1805E-03	4.7539E-03	1.2781E 02	6.3758E-04
21	.2524	45.0	485.94	2.1071E 00	6.2289E-01	7.5602E-04	3.0510E-03	1.1667E 02	4.0936E-04
22	.2943	45.0	492.72	2.1961E 00	7.0411E-01	8.6169E-04	[illegible]	1.1827E 02	4.6640E-04
23	.3363	45.0	496.14	3.2277E 00	9.7026E-01	1.1924E-03	4.8109E-03	1.1909E 02	6.4529E-04
24	.3783	45.0	498.54	4.4889E 00	1.4696E 00	1.8115E-03	7.3070E-03	1.1966E 02	9.8020E-04
25	.4203	45.0	500.43	5.2619E 00	1.5289E 00	1.8889E-03	7.6185E-03	1.2010E 02	1.0220E-03
26	.4623	45.0	504.06	5.4190E 00	1.6355E 00	2.0297E-03	8.1860E-03	1.2096E 02	1.0979E-03
27	.5043	45.0	505.61	5.4034E 00	1.5411E 00	1.9162E-03	7.7265E-03	1.2133E 02	1.0365E-03
100	.9648	315.0	538.44	4.4095E 00	1.0604E 00	1.3746E-03	5.5328E-03	1.2913E 02	7.4220E-04
29	.5882	45.0	508.11	5.1459E 00	1.4178E 00	1.7685E-03	7.1299E-03	1.2193E 02	9.5644E-04
30	.6302	45.0	509.91	4.9809E 00	1.3475E 00	1.6846E-03	6.7909E-03	1.2236E 02	9.1096E-04
31	.6722	45.0	521.17	5.1157E 00	1.3048E 00	1.6545E-03	6.6654E-03	1.2502E 02	8.9413E-04
32	.7170	45.0	524.74	4.1722E 00	1.2180E 00	1.5514E-03	6.2499E-03	1.2587E 02	8.3826E-04
33	.7583	45.0	517.61	4.4397E 00	1.2233E 00	1.5441E-03	6.2219E-03	1.2418E 02	8.3464E-04
34	.7996	45.0	518.53	4.2468E 00	1.1916E 00	1.5058E-03	6.0674E-03	1.2440E 02	8.1391E-04
35	.8409	45.0	520.46	4.1362E 00	1.1731E 00	1.4861E-03	5.9873E-03	1.2486E 02	8.0317E-04
36	.8822	45.0	521.59	4.2498E 00	1.1178E 00	1.4181E-03	5.7129E-03	1.2512E 02	7.6636E-04
37	.9235	45.0	522.81	4.3796E 00	1.1190E 00	1.4218E-03	5.7276E-03	1.2541E 02	7.6833E-04
38	.9648	45.0	530.41	4.2345E 00	1.0183E 00	1.3065E-03	5.2608E-03	1.2722E 02	7.0571E-04
39	.2524	90.0	471.14	3.4521E 00	1.0205E 00	1.2168E-03	4.9153E-03	1.1318E 02	6.5937E-04
40	.2943	90.0	473.42	1.1926E 00	9.9476E-01	1.1893E-03	4.8038E-03	1.1371E 02	6.4440E-04
41	.3363	90.0	478.47	2.4679E 00	9.0521E-01	1.0888E-03	4.3967E-03	1.1490E 02	5.8980E-04
42	.3793	90.0	482.96	2.8379E 00	8.9574E-01	1.0833E-03	4.3733E-03	1.1597E 02	5.8665E-04
43	.4203	90.0	488.09	3.5741E 00	1.0565E 00	1.2857E-03	5.1891E-03	1.1718E 02	6.9609E-04
44	.4623	90.0	491.42	4.0896E 00	1.2704E 00	1.5523E-03	6.2637E-03	1.1797E 02	8.4024E-04
45	.5043	90.0	497.74	7.2096E 00	1.9865E 00	2.4461E-03	9.8673E-03	1.1947E 02	1.3236E-03
46	.5463	90.0	503.11	7.8301E 00	2.2360E 00	2.7717E-03	1.1177E-02	1.2074E 02	1.4994E-03
47	.5882	90.0	504.72	7.1024E 00	2.0713E 00	2.5727E-03	1.0374E-02	1.2112E 02	1.3916E-03
48	.6302	90.0	506.36	7.4550E 00	2.0541E 00	2.5565E-03	1.0307E-02	1.2151E 02	1.3827E-03
49	.6722	90.0	518.33	7.7437E 00	1.9399E 00	2.4509E-03	9.8756E-03	1.2435E 02	1.3248E-03
50	.7170	90.0	523.54	7.1537E 00	1.6845E 00	2.1425E-03	8.6302E-03	1.2559E 02	1.1577E-03
51	.7583	90.0	513.39	6.3030E 00	1.6419E 00	2.0615E-03	8.3049E-03	1.2318E 02	1.1146E-03
52	.7996	90.0	515.52	6.6885E 00	1.7424E 00	2.1935E-03	8.8397E-03	1.2368E 02	1.1858E-03
53	.8409	90.0	517.38	6.4404E 00	1.6630E 00	2.0992E-03	8.4549E-03	1.2412E 02	1.1347E-03
54	.8822	90.0	519.66	6.7002E 00	1.6447E 00	2.0814E-03	8.3861E-03	1.2466E 02	1.1249E-03
55	.9235	90.0	520.97	6.8422E 00	1.6454E 00	2.0856E-03	8.4025E-03	1.2496E 02	1.1272E-03
56	.9648	90.0	527.07	6.7199E 00	1.6100E 00	2.0666E-03	8.3225E-03	1.2562E 02	1.1164E-03
57	.2524	135.0	456.12	1.4856E 00	4.3917E-01	5.1442E-04	2.0798E-03	1.0963E 02	2.7899E-04
58	.2943	135.0	461.32	6.6361E 00	1.4864E 00	1.7518E-03	7.0805E-03	1.1085E 02	9.4981E-04
59	.3363	135.0	468.77	4.4502E 00	1.4046E 00	1.6700E-03	6.7473E-03	1.1261E 02	9.0511E-04
60	.3783	135.0	475.44	4.7837E 00	1.4860E 00	1.7809E-03	7.1927E-03	1.1419E 02	9.6486E-04
61	.4203	135.0	482.16	8.2018E 00	1.8642E 00	2.2524E-03	9.0934E-03	1.1578E 02	1.2198E-03
62	.4623	135.0	489.36	8.1753E 00	2.3754E 00	2.8951E-03	1.1684E-02	1.1748E 02	1.5673E-03
63	.5043	135.0	496.43	1.4888E 01	2.7820E 00	3.4201E-03	1.3797E-02	1.1915E 02	1.8508E-03
64	.5463	135.0	500.24	1.1150E 01	2.9608E 00	3.6571E-03	1.4750E-02	1.2006E 02	1.9787E-03
65	.5882	135.0	504.31	1.0671E 01	2.8334E 00	3.5180E-03	1.4186E-02	1.2103E 02	1.9030E-03
66	.6302	135.0	505.80	1.0348E 01	2.7478E 00	3.4175E-03	1.3779E-02	1.2137E 02	1.8484E-03
67	.6722	135.0	519.47	1.0573E 01	2.5425E 00	3.2168E-03	1.2961E-02	1.2462E 02	1.7386E-03
68	.7170	135.0	523.18	9.4436E 00	2.3416E 00	2.9767E-03	1.1991E-02	1.2550E 02	1.6085E-03
69	.7583	135.0	511.17	6.9640E 00	1.9259E 00	2.4114E-03	9.7200E-03	1.2265E 02	1.3039E-03
70	.7996	135.0	517.50	8.9488E 00	2.6002E 00	3.2816E-03	1.3223E-02	1.2415E 02	1.7738E-03
71	.8409	135.0	519.86	8.8690E 00	2.4437E 00	3.0933E-03	1.2463E-02	1.2471E 02	1.6718E-03
72	.8822	135.0	521.53	9.1101E 00	2.4647E 00	3.1265E-03	1.2595E-02	1.2511E 02	1.6896E-03
73	.9235	135.0	523.49	9.8157E 00	2.3604E 00	3.0017E-03	1.2091E-02	1.2558E 02	1.6220E-03
74	.9648	135.0	532.55	1.0287E 01	2.4738E 00	3.1826E-03	1.2814E-02	1.2773E 02	1.7189E-03
75	.2524	180.0	461.27	5.4421E 00	1.6394E 00	1.9319E-03	7.8085E-03	1.1084E 02	1.0475E-03
76	.2943	180.0	-114.74	6.1927E-08	1.9855E-08	1.3918E-11	5.8086E-11	-2.1034E 01	7.7919E-12
77	.3363	180.0	472.88	5.3495E 00	1.5814E 00	1.8894E-03	7.6319E-03	1.1358E 02	1.0238E-03
78	.3783	180.0	480.61	7.3155E 00	2.1084E 00	2.5431E-03	1.0268E-02	1.1541E 02	1.3774E-03
79	.4203	180.0	489.68	9.7572E 00	2.8843E 00	3.5158E-03	1.4102[illegible]-02	1.1756E 02	1.9038E-03
80	.4623	180.0	498.36	1.2583E 01	3.5933E 00	4.4280E-03	1.7861E-02	1.1961E 02	2.3960E-03
81	.5043	180.0	503.60	1.2705E 01	3.1828E 00	3.9476E-03	1.5919E-02	1.2085E 02	2.1355E-03
82	.5463	180.0	507.46	1.2512E 01	3.3225E 00	4.1407E-03	1.6694E-02	1.2177E 02	2.2395E-03
83	.5882	180.0	509.07	1.0475E 01	2.7816E 00	3.4772E-03	1.4017E-02	1.2234E 02	1.8803E-03
84	.6302	180.0	513.46	1.0183E 01	2.7041E 00	3.3963E-03	1.3688E-02	1.2324E 02	1.8362E-03
85	.6722	180.0	529.49	1.1800E 01	2.8377E 00	3.6315E-03	1.4624E-02	1.2675E 02	1.9618E-03
86	.7170	180.0	533.44	1.1841E 01	2.7885E 00	3.5916E-03	1.4460E-02	1.2794E 02	1.9377E-03
87	.7583	180.0	520.37	9.7163E 00	2.3366E 00	2.9596E-03	1.1924E-02	1.2483E 02	1.5996E-03
88	.7996	180.0	526.92	1.0315E 01	2.6871E 00	3.4322E-03	1.3823E-02	1.2639E 02	1.8543E-03
89	.8409	180.0	529.94	1.0865E 01	2.7760E 00	3.5549E-03	1.4316E-02	1.2687E 02	1.9294E-03
90	.8022	180.0	531.32	1.1917E 01	2.7507E 00	3.5332E-03	1.4226E-02	1.2744E 02	1.9084E-03
91	.9235	180.0	533.18	1.1735E 01	2.8805E 00	3.7088E-03	1.4937E-02	1.2788E 02	2.0031E-03
92	.9648	180.0	541.04	1.2854E 01	2.9620E 00	3.8527E-03	1.5515E-02	1.2975E 02	2.0799E-03
93	.8822	225.0	530.93	9.2332E 00	2.3592E 00	3.0288E-03	1.2196E-02	1.2734E 02	1.6360E-03
94	.9648	225.0	540.30	9.8460E 00	2.3771E 00	3.0849E-03	1.2431E-02	1.2957E 02	1.6676E-03
95	.7170	270.0	536.49	7.7217E 00	1.7409E 00	2.2511E-03	9.0614E-03	1.2867E 02	1.2155E-03
96	.7996	270.0	530.44	6.3744E 00	1.6927E 00	2.1718E-03	8.7453E-03	1.2723E 02	1.1731E-03
97	.8822	270.0	533.01	5.3479E 00	1.5220E 00	2.0879E-03	8.4062E-03	1.2784E 02	1.1276E-03
98	.9648	270.0	539.59	6.4517E 00	1.6477E 00	2.1392E-03	8.6094E-03	1.2940E 02	1.1549E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE

GROUP 15 SYM PHI X/L SYM PHI
MACH NO = 8 0
RE NO = 3.03 X 10**6 45


HEAT TRANSFER PHASE
GROUP 15
MACH NO = 8
RE NO = 3.03 X 10**6
CONE'D = 4
ALPHA = 4
TIME = 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.33
0.55
0.00
0.20
0.40
0.60
0.80
1.00
X/L
32.00
24.00
16.00
8.00
0.00
2.00
6.00
X 10**4

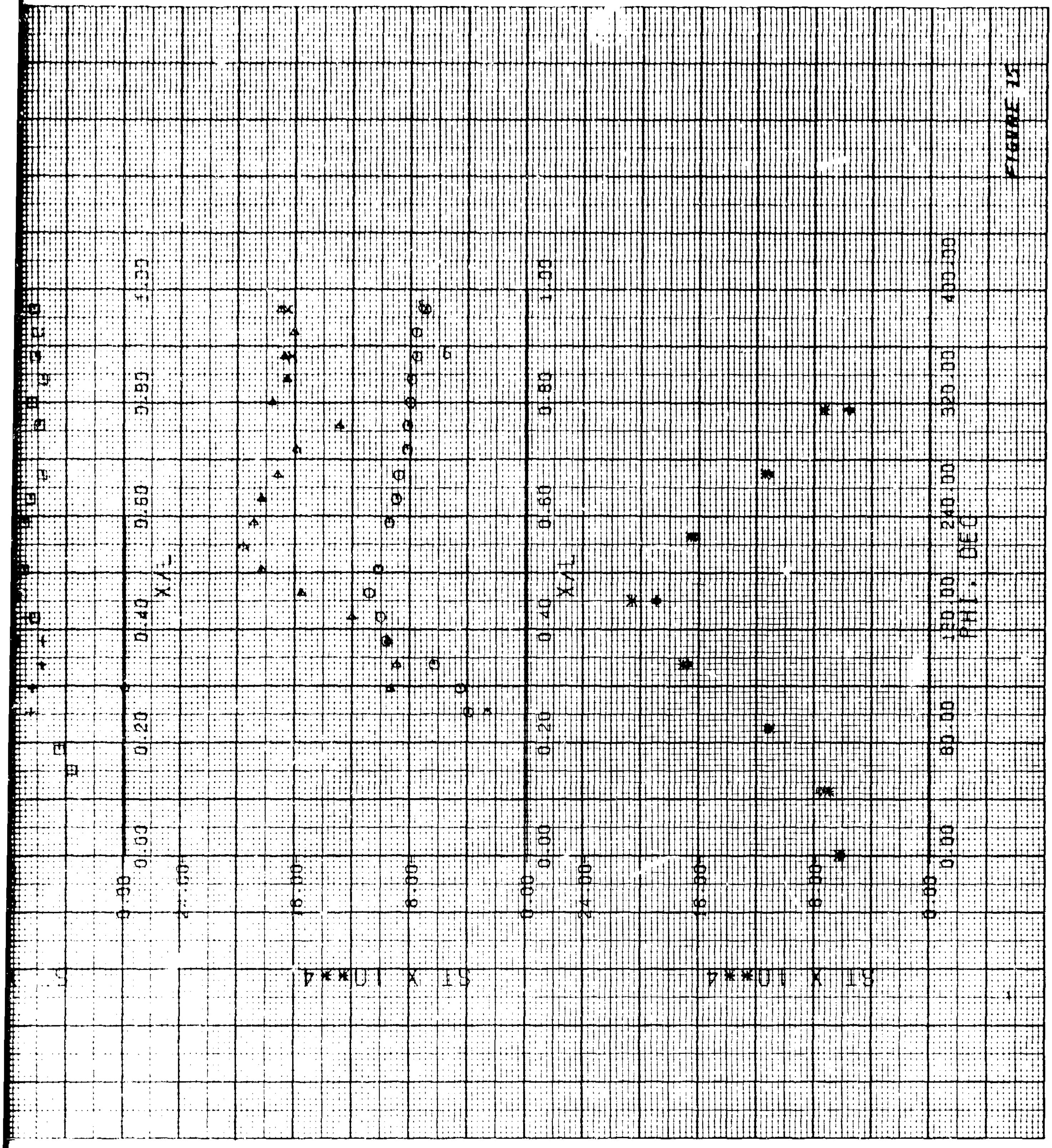


FIGURE 15
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
XΛ1
0.00
0.20
0.40
0.60
0.80
1.00
XΛ
0.00
0.20
0.40
0.60
0.80
1.00
R1 X 10**4
0.00
8.00
16.00
24.00
S1 X 10**4
0.00
8.00
16.00
24.00

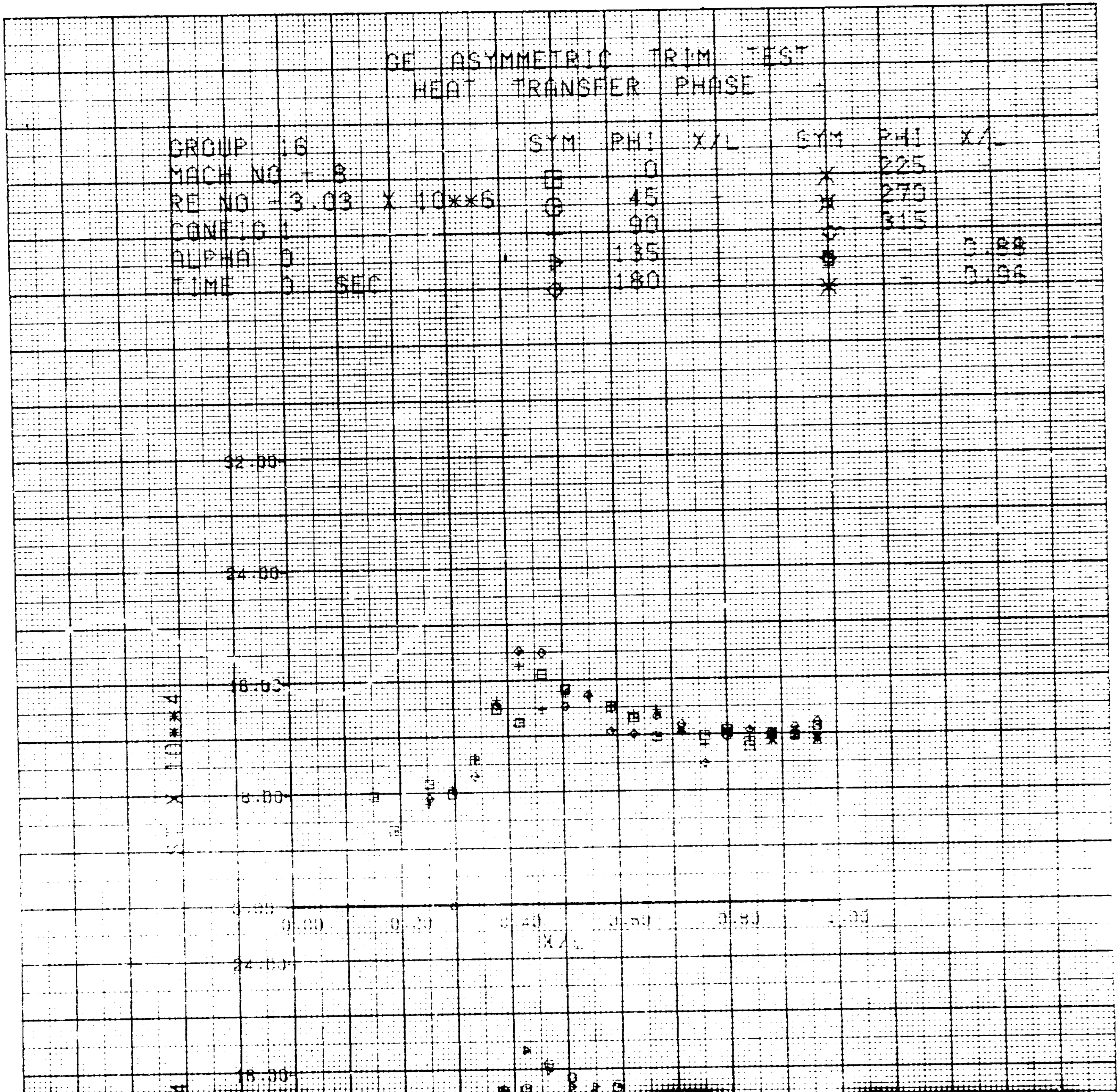
Figure 15

3

```
                                   7/16/69

                    AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                    VON KARMAN GAS DYNAMICS FACILITY
                      50 INCH HYPERSONIC TUNNEL B
                              VT0967-H00
GROUP  CONFIG    ALPHA-M      BETA-M        ALPHA-S     ROLL    ALP-P   DATE      MACH NO        PO           TO            TIME
 16      XI          .05          0            .05          0       0     714        8.00       670.97      1310.52          -.08
   T-INF        P-INF          Q-INF          V-INF        RHO-INF        MU-INF         RE/FT         RE/D          MU
9.49451E 01  6.87269E-02  3.07494E 00  3.82005E 03  6.07188E-05  7.64540E-08  3.03371E 06  2.78332E 06  3.29904E 02

TC NO   X/L      PHI     TEMP      SLOPE        Q-STDW         HT            HM            MW           ST

   1  .1500       0    420.97  9.9399E 00  1.2912E 00  1.4519E-03  5.8790E-03  1.0139E 02  7.0787E-04
   2  .1667       0    420.80  4.3476E 00  8.8891E-01  1.0072E-03  4.0784E-03  1.0301E 02  5.4450E-04
   3  .2524       0    425.16  6.4497E 00  1.4330E 00  1.6193E-03  6.5575E-03  1.0234E 02  8.7470E-04
   4  .2943       0    424.52  6.1373E 00  1.3059E 00  1.4739E-03  5.9640E-03  1.0219E 02  7.9904E-04
   5  .3363       0    415.56  9.1500E 00  1.6880E 00  1.9302E-03  7.4122E-03  1.0478E 02  1.0400E-03
   6  .3783       0    431.50  7.5427E 00  2.2824E 00  2.5905E-03  1.0511E-02  1.0303E 02  1.4085E-03
   7  .4203       0    425.29  7.1693E 00  2.1412E 00  2.4187E-03  9.7951E-03  1.0236E 02  1.3125E-03
   8  .4623       0    440.41  9.5163E 00  2.6690E 00  3.0451E-03  1.2322E-02  1.0593E 02  1.6511E-03
   9  .5043       0    444.58  9.1500E 00  2.4755E 00  2.8589E-03  1.1565E-02  1.0691E 02  1.5497E-03
  10  .5463       0    530.47  2.1287E-03  6.5339E-04  8.3761E-07  3.3727E-06  1.2723E 02  4.5194E-07
  11  .5882       0    453.54  9.1314E 00  2.2405E 00  2.6145E-03  1.0572E-02  1.0903E 02  1.4166E-03
  12  .6302       0    460.17  7.7904E 00  2.1070E 00  2.4784E-03  1.0018E-02  1.1057E 02  1.3424E-03
  13  .6722       0    476.00  7.4750E 00  1.8670E 00  2.2140E-03  8.9410E-03  1.1432E 02  1.1981E-03
  14  .8822   315.0    503.00  6.4904E 00  1.2220E 00  1.5132E-03  6.1022E-03  1.2071E 02  8.1769E-04
  15  .7583       0    477.40  7.4964E 00  1.8508E 00  2.2216E-03  8.9710E-03  1.1465E 02  1.2071E-03
  16  .7996       0    479.75  6.9181E 00  1.9130E 00  2.3027E-03  9.2975E-03  1.1521E 02  1.2459E-03
  17  .8409       0    481.60  6.7555E 00  1.7201E 00  2.0823E-03  8.4069E-03  1.1564E 02  1.1265E-03
  18  .8822       0    485.91  7.1590E 00  1.8430E 00  2.2360E-03  9.0251E-03  1.1667E 02  1.2094E-03
  19  .9235       0    488.58  7.2692E 00  1.8211E 00  2.2156E-03  8.9414E-03  1.1729E 02  1.1981E-03
  20  .9648       0    503.39  7.8619E 00  1.8906E 00  2.3424E-03  9.4450E-03  1.2080E 02  1.2657E-03
  21  .2524    45.0    421.19  6.1166E 00  1.2760E 00  1.4348E-03  5.8119E-03  1.0141E 02  7.7879E-04
  22  .2943    45.0    419.01  6.1454E 00  1.3241E 00  1.4908E-03  6.0395E-03  1.0089E 02  8.0929E-04
  23  .3363    45.0    429.97  5.5959E 00  1.6821E 00  1.9102E-03  7.7337E-03  1.0346E 02  1.0363E-03
  24  .3783    45.0    432.09  7.9302E 00  2.3838E 00  2.7137E-03  1.0986E-02  1.0397E 02  1.4720E-03
  25  .4203    45.0    422.88  8.3674E 00  2.4312E 00  2.7390E-03  1.1093E-02  1.0180E 02  1.4865E-03
  26  .4623    45.0    433.81  9.5308E 00  2.6742E 00  3.0502E-03  1.2347E-02  1.0437E 02  1.6544E-03
  27  .5043    45.0    446.61  9.1565E 00  2.4846E 00  2.8761E-03  1.1634E-02  1.0739E 02  1.5589E-03
 100  .9648   315.0    510.71  7.1047E 00  1.7085E 00  2.1362E-03  8.6107E-03  1.2254E 02  1.1538E-03
  29  .5882    45.0    4[illegible].19  8.4870E 00  2.3602E 00  2.7408E-03  1.1086E-02  1.0752E 02  1.4855E-03
  30  .6302    45.0    456.59  7.8649E 00  2.1278E 00  2.4976E-03  1.0096E-02  1.1021E 02  1.3529E-03
  31  .6722    45.0    476.49  8.8236E 00  2.1659E 00  2.5970E-03  1.0487E-02  1.1444E 02  1.4053E-03
  32  .7170    45.0    488.86  8.2442E 00  1.9414E 00  2.3628E-03  9.5355E-03  1.1736E 02  1.2778E-03
  33  .7583    45.0    476.91  7.0280E 00  1.9364E 00  2.3229E-03  9.3807E-03  1.1453E 02  1.2570E-03
  34  .7996    45.0    478.97  6.9223E 00  1.9142E 00  2.3020E-03  9.2949E-03  1.1502E 02  1.2455E-03
  35  .8409    45.0    482.02  6.7013E 00  1.8130E 00  2.1898E-03  8.8409E-03  1.1588E 02  1.1846E-03
  36  .8822    45.0    486.94  6.7800E 00  1.7833E 00  2.1653E-03  8.7393E-03  1.1691E 02  1.1711E-03
  37  .9235    45.0    488.61  6.9173E 00  1.7674E 00  2.1504E-03  8.6784E-03  1.1730E 02  1.1629E-03
  38  .9648    45.0    503.22  6.9210E 00  1.6644E 00  2.0616E-03  8.3135E-03  1.2076E 02  1.1140E-03
  39  .2524    90.0    423.86  6.0505E 00  1.1974E 00  1.3504E-03  5.4692E-03  1.0203E 02  7.3287E-04
  40  .2943    90.0    421.00  6.2836E 00  1.3734E 00  1.5448E-03  6.2562E-03  1.0136E 02  8.3006E-04
  41  .3363    90.0    431.59  5.1970E 00  1.7037E 00  1.9383E-03  7.8467E-03  1.0384E 02  1.0515E-03
  42  .3783    90.0    436.58  7.5304E 00  2.3768E 00  2.7197E-03  1.1007E-02  1.0502E 02  1.4749E-03
  43  .4203    90.0    427.25  7.6583E 00  2.7960E 00  3.1655E-03  1.2818E-02  1.0283E 02  1.7176E-03
  44  .4623    90.0    430.06  7.3231E 00  2.2748E 00  2.5836E-03  1.0460E-02  1.0349E 02  1.4017E-03
  45  .5043    90.0    446.26  8.7607E 00  2.4138E 00  2.7929E-03  1.1298E-02  1.0730E 02  1.5139E-03
  46  .5463    90.0    447.19  8.9471E 00  2.3837E 00  2.7611E-03  1.1168E-02  1.0752E 02  1.4965E-03
  47  .5882    90.0    448.56  8.0843E 00  2.2689E 00  2.6325E-03  1.0647E-02  1.0787E 02  1.4257E-03
  48  .6302    90.0    456.27  7.7751E 00  2.1623E 00  2.5137E-03  1.0161E-02  1.1013E 02  1.3616E-03
  49  .6722    90.0    478.01  8.5550E 00  2.1433E 00  2.5684E-03  1.0372E-02  1.1432E 02  1.3899E-03
  50  .7170    90.0    488.47  7.9420E 00  1.8703E 00  2.2751E-03  9.1817E-03  1.1727E 02  1.2303E-03
  51  .7583    90.0    473.96  6.7735E 00  1.7645E 00  2.1092E-03  8.5149E-03  1.1384E 02  1.1415E-03
  52  .7996    90.0    477.34  7.1270E 00  1.9089E 00  2.2911E-03  9.2518E-03  1.1464E 02  1.2397E-03
  53  .8409    90.0    480.51  7.2654E 00  1.8201E 00  2.1929E-03  8.8538E-03  1.1539E 02  1.1864E-03
  54  .8822    90.0    485.01  7.6371E 00  1.8256E 00  2.2116E-03  8.9265E-03  1.1645E 02  1.1961E-03
  55  .9235    90.0    487.13  7.6493E 00  1.7914E 00  2.1757E-03  8.7810E-03  1.1695E 02  1.1766E-03
  56  .9648    90.0    500.78  7.7893E 00  1.7529E 00  2.1648E-03  8.7308E-03  1.2019E 02  1.1699E-03
  57  .2524   135.0    415.02  1.1919E 00  3.5234E-01  3.9345E-04  1.5943E-03  9.9958E 01  2.1363E-04
  58  .2943   135.0    414.92  6.7158E 00  1.5120E 00  1.6882E-03  6.8408E-03  9.9933E 01  9.1664E-04
  59  .3363   135.0    425.82  5.5891E 00  1.7641E 00  1.9948E-03  8.0748E-03  1.0249E 02  1.0820E-03
  60  .3783   135.0    431.88  7.6282E 00  2.3696E 00  2.6969E-03  1.0918E-02  1.0392E 02  1.4630E-03
  61  .4203   135.0    420.49  9.6773E 00  2.8789E 00  3.2347E-03  1.3103E-02  1.0124E 02  1.7558E-03
  62  .4623   135.0    426.88  9.0172E 00  2.6200E 00  2.9651E-03  1.2008E-02  1.0274E 02  1.6089E-03
  63  .5043   135.0    440.79  9.3613E 00  2.3919E 00  2.7502E-03  1.1128E-02  1.0602E 02  1.4911E-03
  64  .5463   135.0    443.05  9.0248E 00  2.3905E 00  2.7532E-03  1.1140E-02  1.0584E 02  1.4920E-03
  65  .5882   135.0    445.69  8.4468E 00  2.2430E 00  2.5936E-03  1.0492E-02  1.0717E 02  1.4059E-03
  66  .6302   135.0    455.56  8.1034E 00  2.1519E 00  2.5169E-03  1.0178E-02  1.0949E 02  1.3636E-03
  67  .6722   135.0    474.28  8.4486E 00  2.0798E 00  2.4870E-03  1.0045E-02  1.1391E 02  1.3460E-03
  68  .7170   135.0    487.74  7.9772E 00  1.8786E 00  2.2832E-03  9.2148E-03  1.1710E 02  1.2348E-03
  69  .7583   135.0    472.52  5.1292E 00  1.4953E 00  1.7863E-03  7.2074E-03  1.1350E 02  9.6578E-04
  70  .7996   135.0    478.40  7.0014E 00  2.0343E 00  2.4447E-03  9.8717E-03  1.1489E 02  1.3228E-03
  71  .8409   135.0    483.61  6.9638E 00  1.9187E 00  2.3204E-03  9.3670E-03  1.1612E 02  1.2552E-03
  72  .8822   135.0    486.94  6.9484E 00  1.8798E 00  2.2826E-03  9.2128E-03  1.1692E 02  1.2345E-03
  73  .9235   135.0    488.93  7.1013E 00  1.7631E 00  2.1217E-03  8.5623E-03  1.1738E 02  1.1473E-03
  74  .9648   135.0    503.80  7.6194E 00  1.8324E 00  2.2715E-03  9.1594E-03  1.2090E 02  1.2273E-03
  75  .2524   180.0    421.49  4.3325E 00  1.2589E 00  1.4160E-03  5.7355E-03  1.0148E 02  7.6855E-04
  76  .2943   180.0   -116.76 -1.1546E-14 -3.7020E-15 -2.5937E-18 -1.0825E-17 -2.1036E 01 -1.4505E-18
  77  .3363   180.0    431.58  5.0899E 00  1.5046E 00  1.7119E-03  6.9301E-03  1.0385E 02  9.2862E-04
  78  .3783   180.0    436.82  7.4738E 00  2.3067E 00  2.6402E-03  1.0685E-02  1.0508E 02  1.4318E-03
  79  .4203   180.0    425.95  1.0070E 01  2.9767E 00  3.3651E-03  1.3627E-02  1.0252E 02  1.8260E-03
  80  .4623   180.0    434.40  1.0235E 01  2.9228E 00  3.3361E-03  1.3503E-02  1.0451E 02  1.8095E-03
  81  .5043   180.0    447.36  9.0209E 00  2.2599E 00  2.6182E-03  1.0590E-02  1.0756E 02  1.4191E-03
  82  .5463   180.0    444.77  9.0540E 00  2.4043E 00  2.7771E-03  1.1234E-02  1.0695E 02  1.5054E-03
  83  .5882   180.0    451.56  7.4180E 00  1.9694E 00  2.2933E-03  9.2718E-03  1.0855E 02  1.2427E-03
  84  .6302   180.0    462.25  7.1840E 00  1.9077E 00  2.2449E-03  9.0890E-03  1.1107E 02  1.2179E-03
  85  .6722   180.0    480.67  8.6036E 00  2.0690E 00  2.4931E-03  1.0066E-02  1.1541E 02  1.3488E-03
  86  .7170   180.0    496.20  8.7533E 00  1.9436E 00  2.3867E-03  9.6291E-03  1.1910E 02  1.2902E-03
  87  .7583   180.0    479.06  6.6235E 00  1.5447E 00  1.8579E-03  7.5017E-03  1.1504E 02  1.0052E-03
  88  .7996   180.0    484.50  6.9797E 00  1.8102E 00  2.2012E-03  8.8853E-03  1.1633E 02  1.1906E-03
  89  .8409   180.0    488.89  7.3709E 00  1.8833E 00  2.2920E-03  9.2498E-03  1.1735E 02  1.2395E-03
  90  .8822   180.0    492.20  7.3349E 00  1.8289E 00  2.2345E-03  9.0159E-03  1.1815E 02  1.2081E-03
  91  .9235   180.0    495.66  7.7360E 00  1.8989E 00  2.3304E-03  9.4011E-03  1.1897E 02  1.2597E-03
  92  .9648   180.0    510.64  8.1300E 00  1.9196E 00  2.3998E-03  9.6733E-03  1.2252E 02  1.2962E-03
  93  .8822   225.0    495.99  6.9716E 00  1.7813E 00  2.1869E-03  8.8223E-03  1.1905E 02  1.1822E-03
  94  .9648   225.0    512.95  7.2590E 00  1.7456E 00  2.[illegible]E-03  8.8212E-03  1.2307E 02  1.1820E-03
  95  .7170   270.0    504.68  8.2566E 00  1.8601E 00  2.3083E-03  9.3074E-03  1.2111E 02  1.2472E-03
  96  .7996   270.0    493.29  6.[illegible]E 00  1.8564E 00  2.2715E-03  9.1648E-03  1.1841E 02  1.2281E-03
  97  .8822   270.0    498.11  7.[illegible]E 00  1.7532E 00  2.1581E-03  8.7050E-03  1.1956E 02  1.1665E-03
  98  .9648   270.0    512.95  7.1715E 00  1.7246E 00  2.1623E-03  8.7149E-03  1.2307E 02  1.1678E-03
```

1

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM. PHI X/L   SYM. PHI X/L
GROUP 16


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 16
MACH NO = 8
RE NO = 3.03 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
- 0.88
- 0.96
32.00
24.00
16.00
8.00
0.00
X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00

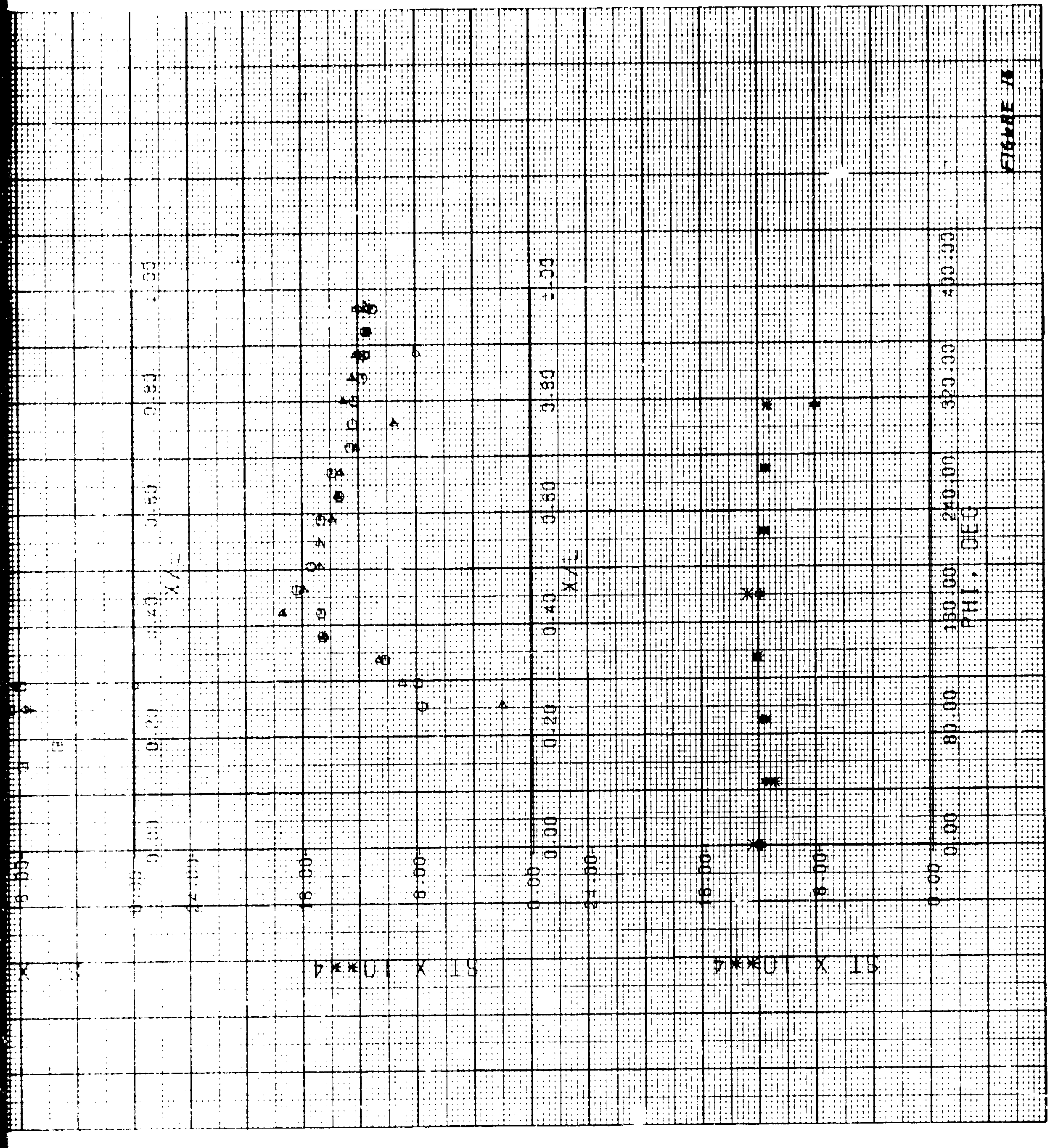


FIGURE 16
X/L
PHI, DEG
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
80.00
160.00
240.00
320.00
400.00
8.00
16.00
24.00

Figure 16

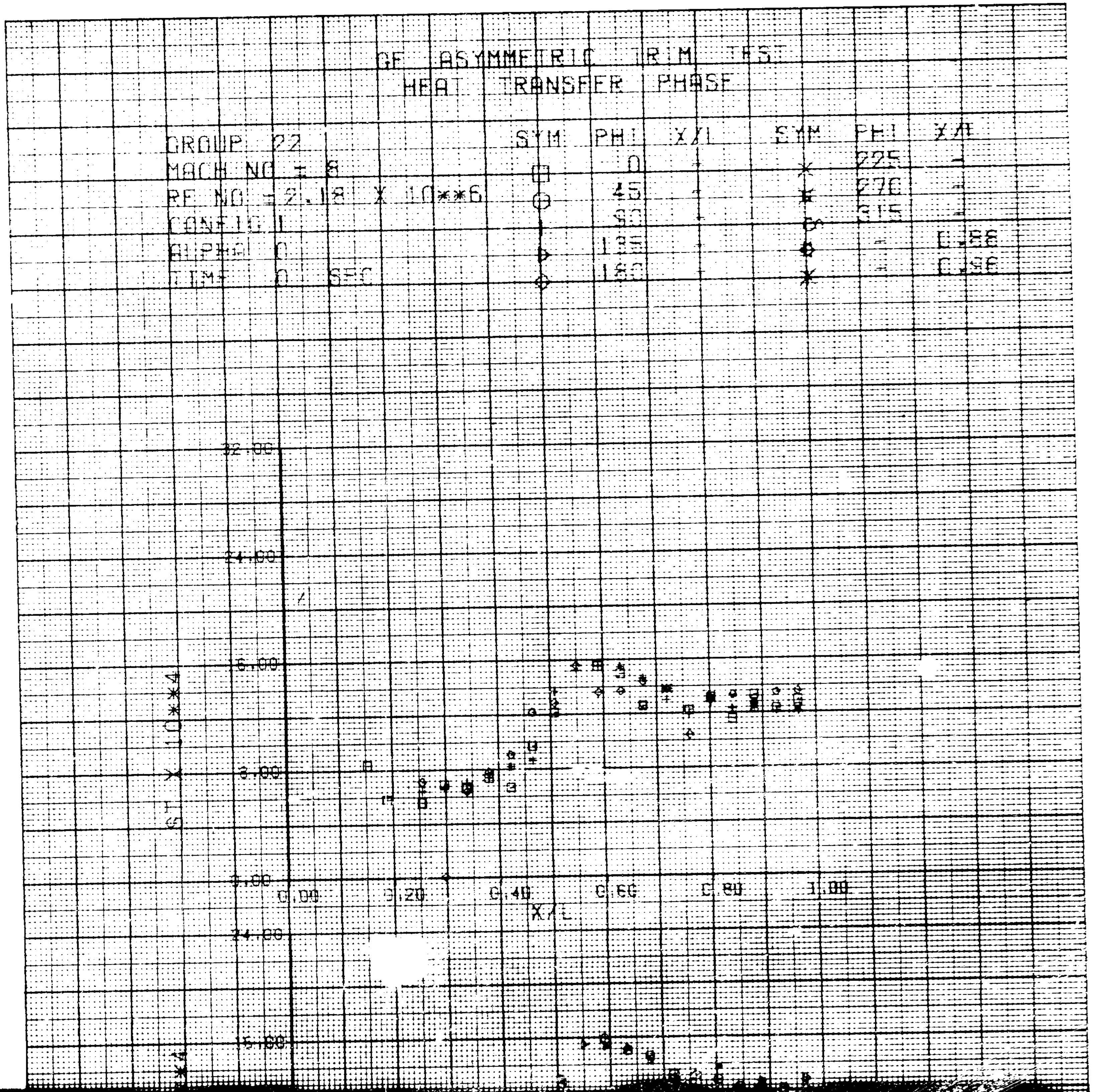
5

```
                                        7/16/69

                         AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                          VON KARMAN GAS DYNAMICS FACILITY
                            50 INCH HYPERSONIC TUNNEL B
                                   V10047-000
GROUP  CONFIG    ALPHA-M      BETA-M       ALPHA-S     ROLL   ALP-P  DATE     MACH NO       PO          TO          TIME
 22       1         .02          0           .02         0       0    714       7.99      660.17     1296.62        -.06
   T-INF       P-INF        Q-INF        V-INF       RHO-INF       MU-INF       RE/FT        HE/U          MU
 9.3497E 01  6.0510E-02  2.1670E 00  3.7097E 03  6.3430E-05  7.5435E-08  2.1022E 06  2.0011E 06  3.1570E 02

TC NO   X/L     PHI    TWHP      SLOPE        Q-STDW        HT           HH          HW          ST

   1   .1500      0   518.70  7.9790E 00  8.3112E-01  1.0914E-03  4.4042E-03  1.2291E 02  8.3194E-04
   2   .1667      0   500.75  2.7209E 00  5.9750E-01  7.5700E-04  3.0540E-03  1.2410E 02  5.7716E-04
   3   .2524      0   501.37  1.9209E 00  5.7020E-01  7.2300E-04  2.9191E-03  1.2032E 02  5.5116E-04
   4   .2943      0   510.99  2.7166E 00  6.9964E-01  8.9809E-04  3.6241E-03  1.2201E 02  6.8425E-04
   5   .3363      0   517.19  2.1131E 00  6.6695E-01  8.6209E-04  3.4609E-03  1.2406E 02  6.5721E-04
   6   .3783      0   520.05  2.4569E 00  7.3053E-01  9.4017E-04  3.8725E-03  1.2495E 02  7.3115E-04
   7   .4203      0   521.57  2.3951E 00  6.6687E-01  8.6781E-04  3.4999E-03  1.2512E 02  6.6080E-04
   8   .4623      0   524.30  3.9262E 00  9.7156E-01  1.2490E-03  5.1169E-03  1.2579E 02  9.6611E-04
   9   .5043      0   525.45  4.4440E 00  1.2133E 00  1.5665E-03  6.3960E-03  1.2604E 02  1.2081E-03
  10   .5463      0   531.03 -1.1900E-01 -3.1905E-02 -4.2107E-05 -1.7064E-04  1.2756E 02 -3.2105E-05
  11   .5882      0   529.76  5.4202E 00  1.5485E 00  2.0368E-03  8.2199E-03  1.2706E 02  1.5503E-03
  12   .6302      0   530.59  5.5120E 00  1.4914E 00  1.9636E-03  7.9152E-03  1.2724E 02  1.4945E-03
  13   .6722      0   528.54  5.0018E 00  1.2531E 00  1.6456E-03  6.6341E-03  1.2470E 02  1.2526E-03
  99   .8822  315.0   545.18  3.1599E 00  8.2314E-01  1.1051E-03  4.4512E-03  1.3073E 02  8.4042E-04
  15   .7583      0   538.53  5.0037E 00  1.2033E 00  1.6012E-03  6.4516E-03  1.2915E 02  1.2181E-03
  16   .7996      0   541.62  4.5910E 00  1.2881E 00  1.7212E-03  6.9339E-03  1.2989E 02  1.3092E-03
  17   .8409      0   541.94  4.4261E 00  1.1314E 00  1.5125E-03  6.0930E-03  1.2997E 02  1.1504E-03
  18   .8822      0   544.43  5.1841E 00  1.2987E 00  1.7419E-03  7.0161E-03  1.3056E 02  1.3247E-03
  19   .9235      0   543.70  4.8050E 00  1.2037E 00  1.6129E-03  6.4970E-03  1.3038E 02  1.2267E-03
  20   .9648      0   541.39  5.2578E 00  1.2644E 00  1.6889E-03  6.8041E-03  1.2963E 02  1.2847E-03
  21   .2524   45.0   499.32  2.4977E 00  7.3836E-01  9.3380E-04  3.7706E-03  1.1964E 02  7.1191E-04
  22   .2943   45.0   510.19  2.1129E 00  6.7744E-01  8.6870E-04  3.5056E-03  1.2242E 02  6.6109E-04
  23   .3363   45.0   516.81  2.7311E 00  6.7068E-01  8.6739E-04  3.4991E-03  1.2399E 02  6.6065E-04
  24   .3783   45.0   521.28  2.4152E 00  7.2601E-01  9.4441E-04  3.8049E-03  1.2505E 02  7.1916E-04
  25   .4203   45.0   522.91  2.4698E 00  7.1762E-01  9.3548E-04  3.7725E-03  1.2544E 02  7.1227E-04
  26   .4623   45.0   526.54  3.1580E 00  9.4217E-01  1.2340E-03  4.9755E-03  1.2630E 02  9.3961E-04
  27   .5043   45.0   529.10  4.7657E 00  1.2655E 00  1.6633E-03  6.7054E-03  1.2693E 02  1.2660E-03
 100   .9648  315.0   546.75  4.8124E 00  1.1574E 00  1.5572E-03  6.2714E-03  1.3111E 02  1.1841E-03
  29   .5882   45.0   531.81  5.7501E 00  1.5843E 00  2.0895E-03  8.4223E-03  1.2755E 02  1.5902E-03
  30   .6302   45.0   532.64  5.5220E 00  1.4941E 00  1.9728E-03  7.9519E-03  1.2775E 02  1.5013E-03
  31   .6722   45.0   532.48  5.4290E 00  1.4554E 00  1.9212E-03  7.7415E-03  1.2771E 02  1.4620E-03
  32   .7170   45.0   535.18  5.5675E 00  1.3111E 00  1.7369E-03  6.9988E-03  1.2836E 02  1.3216E-03
  33   .7583   45.0   540.64  4.4745E 00  1.2880E 00  1.7187E-03  6.9243E-03  1.2965E 02  1.3074E-03
  34   .7996   45.0   543.71  4.4764E 00  1.2561E 00  1.6831E-03  6.7798E-03  1.3039E 02  1.2801E-03
  35   .8409   45.0   546.16  4.6256E 00  1.1973E 00  1.6095E-03  6.4875E-03  1.3096E 02  1.2239E-03
  36   .8822   45.0   547.37  4.5133E 00  1.1924E 00  1.6056E-03  6.4641E-03  1.3126E 02  1.2208E-03
  37   .9235   45.0   546.74  4.8296E 00  1.1829E 00  1.5914E-03  6.4093E-03  1.3111E 02  1.2161E-03
  38   .9648   45.0   544.59  4.5242E 00  1.0880E 00  1.4596E-03  5.8790E-03  1.3060E 02  1.1100E-03
  39   .2524   90.0   503.80  2.2260E 00  6.5802E-01  8.3694E-04  3.3786E-03  1.2040E 02  6.3791E-04
  40   .2943   90.0   514.33  2.1183E 00  6.7919E-01  8.7559E-04  3.5326E-03  1.2340E 02  6.6690E-04
  41   .3363   90.0   520.42  2.2330E 00  7.0506E-01  9.1614E-04  3.6950E-03  1.2484E 02  6.9764E-04
  42   .3783   90.0   523.16  2.3396E 00  7.3846E-01  9.6296E-04  3.8832E-03  1.2550E 02  7.3318E-04
  43   .4203   90.0   525.28  2.7663E 00  8.1774E-01  1.0692E-03  4.3112E-03  1.2598E 02  8.1390E-04
  44   .4623   90.0   525.90  2.7721E 00  8.6111E-01  1.1269E-03  4.5430E-03  1.2615E 02  8.5790E-04
  45   .5043   90.0   528.77  4.9535E 00  1.3644E 00  1.7929E-03  7.2278E-03  1.2683E 02  1.3647E-03
  46   .5463   90.0   529.82  5.3240E 00  1.5204E 00  2.0000E-03  8.0672E-03  1.2708E 02  1.5222E-03
  47   .5882   90.0   531.97  5.6981E 00  1.5427E 00  2.0349E-03  8.2020E-03  1.2750E 02  1.5486E-03
  48   .6302   90.0   532.03  5.5600E 00  1.5319E 00  2.0227E-03  8.1529E-03  1.2775E 02  1.5392E-03
  49   .6722   90.0   531.52  5.7898E 00  1.4505E 00  1.9123E-03  7.7079E-03  1.2748E 02  1.4553E-03
  50   .7170   90.0   534.09  5.4423E 00  1.2816E 00  1.6970E-03  6.8390E-03  1.2826E 02  1.2912E-03
  51   .7583   90.0   537.78  4.5201E 00  1.1775E 00  1.5653E-03  6.3073E-03  1.2897E 02  1.1909E-03
  52   .7996   90.0   541.32  4.9290E 00  1.2579E 00  1.6802E-03  6.7688E-03  1.2982E 02  1.2780E-03
  53   .8409   90.0   542.47  4.8108E 00  1.2052E 00  1.6121E-03  6.4941E-03  1.3008E 02  1.2261E-03
  54   .8822   90.0   544.04  4.9472E 00  1.2144E 00  1.6279E-03  6.5574E-03  1.3046E 02  1.2381E-03
  55   .9235   90.0   542.98  4.9087E 00  1.1804E 00  1.5801E-03  6.3652E-03  1.3021E 02  1.2010E-03
  56   .9648   90.0   539.77  4.9259E 00  1.1846E 00  1.5789E-03  6.3613E-03  1.2945E 02  1.2011E-03
  57   .2524  135.0   499.59  5.4868E-01  1.6811E-01  2.1268E-04  8.5875E-04  1.1990E 02  1.6214E-04
  58   .2943  135.0   509.25  2.3446E 00  7.5171E-01  9.6278E-04  3.8855E-03  1.2219E 02  7.3360E-04
  59   .3363  135.0   514.29  2.2974E 00  7.2512E-01  9.3476E-04  3.7713E-03  1.2339E 02  7.1205E-04
  60   .3783  135.0   517.00  2.3141E 00  7.1887E-01  9.2995E-04  3.7514E-03  1.2403E 02  7.0820E-04
  61   .4203  135.0   518.67  2.4124E 00  8.4540E-01  1.0960E-03  4.4208E-03  1.2443E 02  8.3468E-04
  62   .4623  135.0   520.14  3.4472E 00  1.0016E 00  1.3010E-03  5.2474E-03  1.2478E 02  9.9074E-04
  63   .5043  135.0   522.34  5.1251E 00  1.3095E 00  1.7059E-03  6.8794E-03  1.2531E 02  1.2989E-03
  64   .5463  135.0   523.70  5.8668E 00  1.5579E 00  2.0330E-03  8.1981E-03  1.2563E 02  1.5479E-03
  65   .5882  135.0   525.33  5.8877E 00  1.5422E 00  2.0168E-03  8.1320E-03  1.2601E 02  1.5354E-03
  66   .6302  135.0   525.51  5.7516E 00  1.5273E 00  1.9970E-03  8.0553E-03  1.2606E 02  1.5209E-03
  67   .6722  135.0   527.08  5.9336E 00  1.4269E 00  1.8703E-03  7.5405E-03  1.2643E 02  1.4237E-03
  68   .7170  135.0   528.79  5.4373E 00  1.2804E 00  1.6821E-03  6.7810E-03  1.2683E 02  1.2803E-03
  69   .7583  135.0   528.97  3.3202E 00  9.3157E-01  1.2241E-03  4.9346E-03  1.2688E 02  9.3168E-04
  70   .7996  135.0   533.70  4.6917E 00  1.3632E 00  1.8026E-03  7.2651E-03  1.2802E 02  1.3717E-03
  71   .8409  135.0   535.24  4.3533E 00  1.1995E 00  1.5891E-03  6.4042E-03  1.2437E 02  1.2092E-03
  72   .8822  135.0   536.37  4.4390E 00  1.2550E 00  1.6653E-03  6.7107E-03  1.2864E 02  1.2670E-03
  73   .9235  135.0   537.43  4.8344E 00  1.1867E 00  1.5768E-03  6.3538E-03  1.2889E 02  1.1996E-03
  74   .9648  135.0   536.64  5.2848E 00  1.2709E 00  1.6869E-03  6.7977E-03  1.2870E 02  1.2834E-03
  75   .2524  180.0   500.58  2.5191E 00  7.3195E-01  9.2717E-04  3.7435E-03  1.2014E 02  7.0680E-04
  76   .2943  180.0  -116.76 -1.1546E-14 -3.7020E-15 -2.6315E-18 -1.0905E-17 -2.1036E 01 -2.0759E-18
  77   .3363  180.0   516.61  2.1738E 00  6.4260E-01  8.3086E-04  3.3517E-03  1.2394E 02  6.3283E-04
  78   .3783  180.0   519.44  2.5987E 00  7.8118E-01  1.0138E-03  4.0889E-03  1.2461E 02  7.7201E-04
  79   .4203  180.0   522.38  3.6749E 00  9.0896E-01  1.1840E-03  4.7747E-03  1.2529E 02  9.0150E-04
  80   .4623  180.0   524.55  4.2643E 00  1.2178E 00  1.5909E-03  6.4160E-03  1.2583E 02  1.2112E-03
  81   .5043  180.0   526.48  5.1347E 00  1.2863E 00  1.6847E-03  6.7926E-03  1.2629E 02  1.2825E-03
  82   .5463  180.0   527.92  5.9531E 00  1.5543E 00  2.0395E-03  8.2223E-03  1.2663E 02  1.5524E-03
  83   .5882  180.0   528.66  5.1031E 00  1.3551E 00  1.7799E-03  7.1754E-03  1.2680E 02  1.3540E-03
  84   .6302  180.0   530.81  5.1150E 00  1.3585E 00  1.7894E-03  7.2170E-03  1.2731E 02  1.3618E-03
  85   .6722  180.0   532.93  5.9228E 00  1.4243E 00  1.8813E-03  7.5856E-03  1.2782E 02  1.4316E-03
  86   .7170  180.0   534.78  5.7837E 00  1.3620E 00  1.8034E-03  7.2678E-03  1.2826E 02  1.3722E-03
  87   .7583  180.0   534.05  4.2575E 00  1.0238E 00  1.3558E-03  5.4639E-03  1.2820E 02  1.0316E-03
  88   .7996  180.0   538.36  4.8977E 00  1.2758E 00  1.6974E-03  6.8392E-03  1.2911E 02  1.2913E-03
  89   .8409  180.0   539.77  5.1136E 00  1.3066E 00  1.7415E-03  7.0146E-03  1.2945E 02  1.3240E-03
  90   .8822  180.0   540.94  5.1787E 00  1.2345E 00  1.6546E-03  6.6661E-03  1.2972E 02  1.2506E-03
  91   .9235  180.0   541.48  5.1748E 00  1.3194E 00  1.7626E-03  7.1086E-03  1.2985E 02  1.3406E-03
  92   .9648  180.0   542.53  5.7560E 00  1.3266E 00  1.7767E-03  7.1443E-03  1.3010E 02  1.3490E-03
  93   .8822  225.0   543.43  4.7677E 00  1.2182E 00  1.6317E-03  6.5727E-03  1.3032E 02  1.2410E-03
  94   .9648  225.0   543.49  5.0841E 00  1.2226E 00  1.6378E-03  6.5971E-03  1.3033E 02  1.2456E-03
  95   .7170  270.0   539.50  4.8115E 00  1.3553E 00  1.8060E-03  7.2765E-03  1.2941E 02  1.3739E-03
  96   .7996  270.0   548.71  4.7794E 00  1.2643E 00  1.7122E-03  6.8962E-03  1.3158E 02  1.3019E-03
  97   .8822  270.0   550.18  5.7335E 00  1.2899E 00  1.8347E-03  8.5835E-03  1.3192E 02  1.2420E-03
  98   .9648  270.0   546.01  4.4351E 00  1.1868E 00  1.5968E-03  6.4311E-03  1.3112E 02  1.2142E-03
```

GF ASYMMETRIC R M 45

HEAT TRANSFER PHASE

GROUP 22 SYM PHI X/L SYM PHI X/L


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 22
MACH NO = 8
RE NO = 2.18 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
□ 0 -
○ 45 -
| 90 -
▷ 135 -
◇ 180 -
SYM PHI X/L
✕ 225 -
✕ 270 -
◇ 315 -
✦ - 0.88
✶ - 0.96
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4
24.00
16.00
ST X 10**4

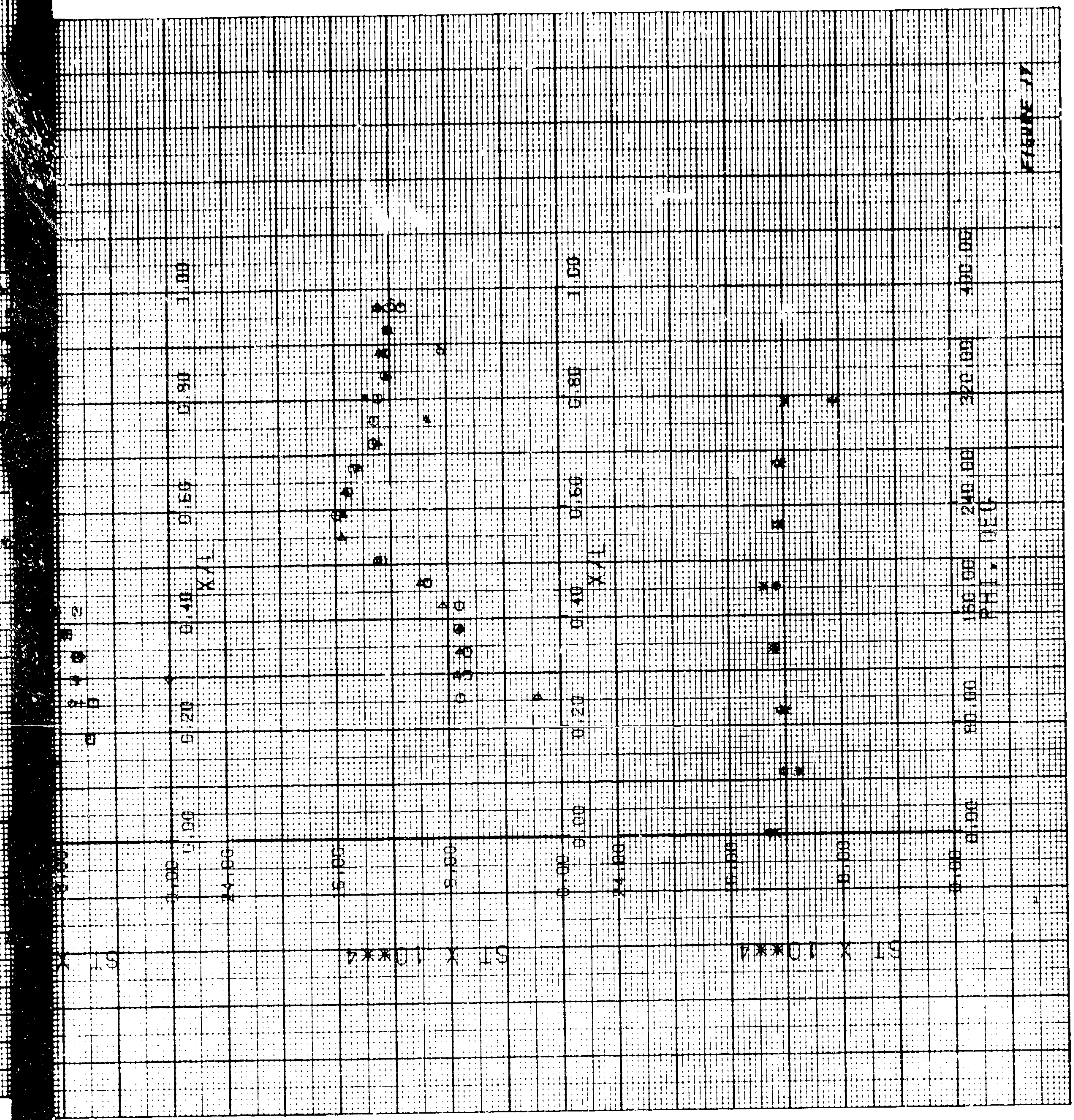
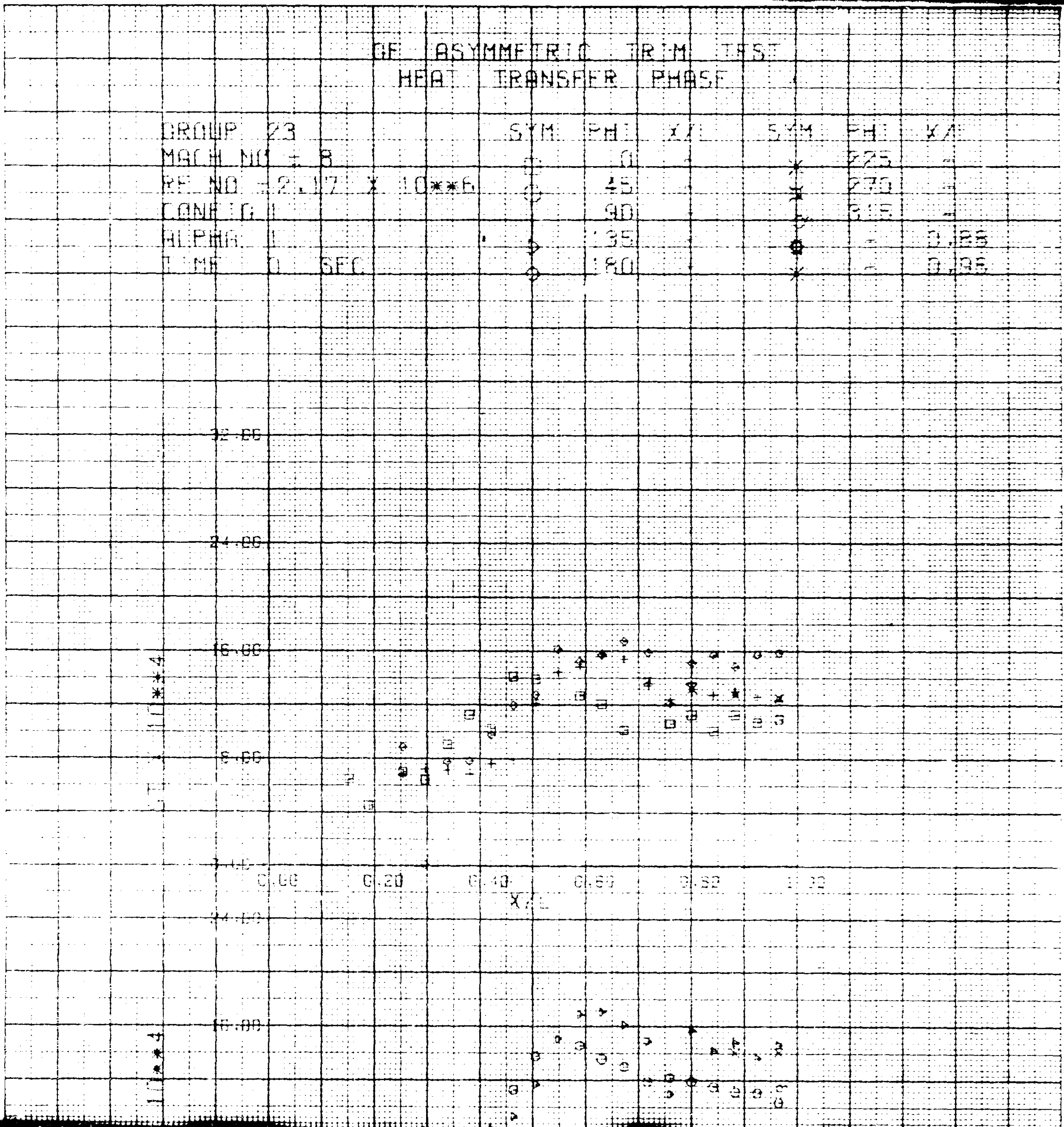


FIGURE 17
X/L
0.00
0.20
0.40
0.60
0.80
1.00
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
ST X 10**4
0.00
8.00
16.00
24.00
G X

Figure 17

```
                                   7/14/69

                  AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                    VON KARMAN GAS DYNAMICS FACILITY
                      50 INCH HYPERSONIC TUNNEL B
                               VT0947-B00
GROUP  CONFIG     ALPHA-M      BETA-M      ALPHA-S     ROLL   ALPHA-P  DATE     MACH NO        PO         TO          TIME
 23       1         1.10          0          1.10        0       0      714       7.99        668.87     1291.97       -.00
   T-INF         P-INF        Q-INF        V-INF       RHO-INF       MU-INF        RE/FT        RE/D          MU
 9.30385E 01  4.84173E-02  2.16169E 00  3.79257E 03  4.32894E-05  7.55449E-08  2.17312E 06  1.99314E 06  3.16185E 02

TC NO   X/L     PHI     T-WP     SLOPE        Q-STDG       HT          HH          HW          ST

  1   .1500      0    451.19  3.7043E 00  7.4959E-01  8.4398E-04  3.4169E-03  1.0846E 02  8.4877E-04
  2   .1047      0    455.30  2.2280E 00  6.8944E-01  5.8499E-04  2.3675E-03  1.0943E 02  4.4428E-04
  3   .2524      0    460.57  2.5612E 00  7.5772E-01  9.1137E-04  3.6874E-03  1.1068E 02  6.9407E-04
  4   .2943      0    468.84  2.1765E 00  6.8694E-01  8.3459E-04  3.3752E-03  1.1263E 02  6.3497E-04
  5   .3363      0    475.84  1.9424E 00  9.6026E-01  1.1766E-03  4.7565E-03  1.1428E 02  9.8947E-04
  6   .3783      0    482.82  3.3407E 00  1.1846E 00  1.4640E-03  5.9161E-03  1.1593E 02  1.1200E-03
  7   .4203      0    487.41  3.4093E 00  1.0749E 00  1.3360E-03  5.3976E-03  1.1702E 02  1.0218E-03
  8   .4623      0    496.48  5.1382E 00  1.4700E 00  1.8443E-03  7.4484E-03  1.1849E 02  1.4101E-03
  9   .5043      0    498.16  5.1159E 00  1.4436E 00  1.8185E-03  7.3420E-03  1.1956E 02  1.3900E-03
 10   .5463      0    512.18  5.4156E-02  1.6311E-02  2.1478E-05  8.6553E-05  1.2164E 02  1.6386E-05
 11   .5882      0    505.99  4.7280E 00  1.3027E 00  1.6574E-03  6.6803E-03  1.2142E 02  1.2664E-03
 12   .6302      0    510.95  4.5409E 00  1.2285E 00  1.5724E-03  6.3460E-03  1.2260E 02  1.2315E-03
 13   .6722      0    520.24  4.0672E 00  1.0189E 00  1.3203E-03  5.3245E-03  1.2480E 02  1.0080E-03
 99   .8022  315.0    529.94  1.0106E 00  7.8426E-01  1.0292E-03  4.1483E-03  1.2711E 02  7.8532E-04
 15   .7503      0    521.72  4.4332E 00  1.0861E 00  1.3841E-03  5.5814E-03  1.2515E 02  1.0566E-03
 16   .7996      0    521.41  4.0372E 00  1.1327E 00  1.4700E-03  5.9280E-03  1.2508E 02  1.1222E-03
 17   .8409      0    521.01  1.4556E 00  1.0107E 00  1.3121E-03  5.2910E-03  1.2514E 02  1.0016E-03
 18   .8822      0    525.09  4.5006E 00  1.1275E 00  1.4702E-03  5.9277E-03  1.2596E 02  1.1222E-03
 19   .9235      0    527.39  4.2568E 00  1.0664E 00  1.3948E-03  5.6226E-03  1.2650E 02  1.0644E-03
 20   .9648      0    532.04  4.5109E 00  1.0847E 00  1.4274E-03  5.7526E-03  1.2761E 02  1.0890E-03
 21   .2524   45.0    458.79  2.3530E 00  6.9580E-01  8.3512E-04  3.3792E-03  1.1026E 02  6.3972E-04
 22   .2943   45.0    465.78  2.1440E 00  6.8765E-01  8.3232E-04  3.3668E-03  1.1191E 02  6.3734E-04
 23   .3363   45.0    472.11  2.2400E 00  6.7333E-01  8.2128E-04  3.3240E-03  1.1340E 02  6.2867E-04
 24   .3783   45.0    478.61  2.6670E 00  8.0196E-01  9.8600E-04  3.9854E-03  1.1494E 02  7.5449E-04
 25   .4203   45.0    484.41  2.4068E 00  8.1554E-01  1.0099E-03  4.0806E-03  1.1631E 02  7.7251E-04
 26   .4623   45.0    491.91  4.2180E 00  1.1836E 00  1.4795E-03  5.9757E-03  1.1809E 02  1.1313E-03
 27   .5043   45.0    497.47  5.4066E 00  1.4357E 00  1.8071E-03  7.2967E-03  1.1940E 02  1.3814E-03
100   .9648  315.0    537.13  4.7393E 00  1.1397E 00  1.5094E-03  6.0835E-03  1.2882E 02  1.1517E-03
 29   .5882   45.0    504.32  5.6593E 00  1.5842E 00  1.9097E-03  7.7084E-03  1.2102E 02  1.4593E-03
 30   .6302   45.0    509.72  5.1577E 00  1.3954E 00  1.7838E-03  7.1978E-03  1.2231E 02  1.3626E-03
 31   .6722   45.0    522.22  4.1635E 00  1.3166E 00  1.7104E-03  6.8970E-03  1.2527E 02  1.3057E-03
 32   .7170   45.0    525.63  5.0840E 00  1.1972E 00  1.5623E-03  6.2985E-03  1.2608E 02  1.1926E-03
 33   .7503   45.0    520.63  4.4798E 00  1.2343E 00  1.6002E-03  6.4532E-03  1.2489E 02  1.2217E-03
 34   .7996   45.0    520.41  4.2906E 00  1.2039E 00  1.5603E-03  6.2974E-03  1.2484E 02  1.1912E-03
 35   .8409   45.0    522.72  4.2968E 00  1.1625E 00  1.5112E-03  6.0935E-03  1.2539E 02  1.1536E-03
 36   .8822   45.0    524.96  4.2683E 00  1.1227E 00  1.4637E-03  5.9013E-03  1.2592E 02  1.1172E-03
 37   .9235   45.0    528.17  4.3397E 00  1.1004E 00  1.4517E-03  5.8521E-03  1.2669E 02  1.1079E-03
 38   .9648   45.0    533.01  4.2900E 00  1.0317E 00  1.3604E-03  5.4821E-03  1.2798E 02  1.0378E-03
 39   .2524   90.0    463.21  2.4905E 00  7.3621E-01  8.8832E-04  3.5936E-03  1.1130E 02  6.8032E-04
 40   .2943   90.0    469.31  2.4039E 00  7.7074E-01  9.3689E-04  3.7888E-03  1.1274E 02  7.1728E-04
 41   .3363   90.0    475.02  2.3825E 00  7.5194E-01  9.2047E-04  3.7213E-03  1.1409E 02  7.0448E-04
 42   .3783   90.0    481.15  2.2821E 00  7.2029E-01  8.8034E-04  3.5902E-03  1.1554E 02  6.7966E-04
 43   .4203   90.0    486.41  2.7015E 00  7.9854E-01  9.9133E-04  4.0053E-03  1.1678E 02  7.5825E-04
 44   .4623   90.0    490.66  2.4548E 00  8.2468E-01  1.0292E-03  4.1571E-03  1.1779E 02  7.8700E-04
 45   .5043   90.0    495.89  4.5555E 00  1.2552E 00  1.5767E-03  6.3670E-03  1.1903E 02  1.2056E-03
 46   .5463   90.0    501.55  5.2224E 00  1.4914E 00  1.8868E-03  7.6169E-03  1.2037E 02  1.4420E-03
 47   .5882   90.0    504.54  5.4324E 00  1.5242E 00  1.9357E-03  7.8130E-03  1.2108E 02  1.4791E-03
 48   .6302   90.0    509.06  5.4727E 00  1.6181E 00  2.0688E-03  8.3400E-03  1.2215E 02  1.5789E-03
 49   .6722   90.0    521.86  6.1866E 00  1.5459E 00  2.0125E-03  8.1154E-03  1.2519E 02  1.5364E-03
 50   .7170   90.0    525.65  5.7229E 00  1.3477E 00  1.7586E-03  7.0902E-03  1.2609E 02  1.3423E-03
 51   .7503   90.0    518.13  4.4150E 00  1.2543E 00  1.6209E-03  6.5375E-03  1.2430E 02  1.2376E-03
 52   .7996   90.0    518.19  5.1050E 00  1.3820E 00  1.7859E-03  7.2030E-03  1.2431E 02  1.3636E-03
 53   .8409   90.0    519.74  5.1250E 00  1.2839E 00  1.6626E-03  6.7052E-03  1.2468E 02  1.2694E-03
 54   .8822   90.0    522.52  5.3192E 00  1.3057E 00  1.6969E-03  6.8426E-03  1.2535E 02  1.2954E-03
 55   .9235   90.0    524.85  5.7583E 00  1.2645E 00  1.6484E-03  6.6446E-03  1.2590E 02  1.2582E-03
 56   .9648   90.0    529.41  5.0937E 00  1.2249E 00  1.6063E-03  6.4749E-03  1.2698E 02  1.2258E-03
 57   .2524  135.0    459.52  7.1093E-01  2.1810E-01  2.5246E-04  1.0215E-03  1.1043E 02  1.9338E-04
 58   .2943  135.0    467.58  2.7704E 00  4.8825E-01  1.0774E-03  4.3576E-03  1.1233E 02  8.2496E-04
 59   .3363  135.0    472.51  2.7426E 00  8.6566E-01  1.0564E-03  4.2713E-03  1.1369E 02  8.0860E-04
 60   .3783  135.0    478.44  2.4530E 00  8.2437E-01  1.0133E-03  4.0957E-03  1.1490E 02  7.7541E-04
 61   .4203  135.0    483.44  2.4584E 00  8.8931E-01  1.0999E-03  4.4446E-03  1.1608E 02  8.4143E-04
 62   .4623  135.0    488.58  3.3696E 00  9.7904E-01  1.2187E-03  4.9232E-03  1.1729E 02  9.3202E-04
 63   .5043  135.0    493.77  4.7908E 00  1.2241E 00  1.5336E-03  6.1936E-03  1.1852E 02  1.1725E-03
 64   .5463  135.0    497.85  5.9016E 00  1.5672E 00  1.9735E-03  7.9683E-03  1.1949E 02  1.5085E-03
 65   .5882  135.0    502.59  6.4786E 00  1.7469E 00  2.2131E-03  8.9335E-03  1.2061E 02  1.6912E-03
 66   .6302  135.0    506.60  6.6386E 00  1.7624E 00  2.2440E-03  9.0569E-03  1.2157E 02  1.7145E-03
 67   .6722  135.0    519.56  6.7828E 00  1.6311E 00  2.1118E-03  8.5147E-03  1.2464E 02  1.6123E-03
 68   .7170  135.0    522.30  6.3850E 00  1.5034E 00  1.9538E-03  7.8743E-03  1.2529E 02  1.4915E-03
 69   .7583  135.0    513.98  3.0944E 00  1.1207E 00  1.4404E-03  5.8110E-03  1.2330E 02  1.1001E-03
 70   .7996  135.0    516.22  5.5022E 00  1.5987E 00  2.0609E-03  8.3130E-03  1.2385E 02  1.5738E-03
 71   .8409  135.0    517.87  5.2295E 00  1.4409E 00  1.8614E-03  7.5076E-03  1.2424E 02  1.4213E-03
 72   .8822  135.0    519.78  5.5392E 00  1.4986E 00  1.9407E-03  7.8248E-03  1.2469E 02  1.4817E-03
 73   .9235  135.0    522.57  5.6029E 00  1.3753E 00  1.7874E-03  7.2075E-03  1.2534E 02  1.3645E-03
 74   .9648  135.0    530.19  6.0792E 00  1.4619E 00  1.9191E-03  7.7352E-03  1.2717E 02  1.4644E-03
 75   .2524  180.0    460.58  3.2858E 00  9.5473E-01  1.1484E-03  4.6462E-03  1.1068E 02  8.7950E-04
 76   .2943  180.0   -116.76 -1.1566E-14 -3.7020E-15 -2.6279E-18 -1.0979E-17 -2.1036E 01 -2.0784E-18
 77   .3363  180.0    479.50  2.7602E 00  8.1594E-01  1.0043E-03  4.0591E-03  1.1515E 02  7.6843E-04
 78   .3783  180.0    485.95  2.7051E 00  8.1314E-01  1.0088E-03  4.0760E-03  1.1667E 02  7.7164E-04
 79   .4203  180.0    491.71  3.4509E 00  1.0201E 00  1.2748E-03  5.1489E-03  1.1804E 02  9.7475E-04
 80   .4623  180.0    497.37  4.3400E 00  1.2394E 00  1.5597E-03  6.2980E-03  1.1938E 02  1.1929E-03
 81   .5043  180.0    502.5[illegible]  5.2438E 00  1.3137E 00  1.6641E-03  6.7179E-03  1.2060E 02  1.2717E-03
 82   .5463  180.0    507.20  6.2161E 00  1.6507E 00  2.1034E-03  8.4887E-03  1.2171E 02  1.6070E-03
 83   .5882  180.0    510.26  5.8626E 00  1.5568E 00  1.9916E-03  8.0360E-03  1.2243E 02  1.5213E-03
 84   .6302  180.0    515.99  6.0024E 00  1.5939E 00  2.0541E-03  8.2857E-03  1.2379E 02  1.5686E-03
 85   .6722  180.0    527.56  6.9499E 00  1.6713E 00  2.1864E-03  8.8139E-03  1.2654E 02  1.6686E-03
 86   .7170  180.0    530.74  6.7146E 00  1.5812E 00  2.0772E-03  8.3722E-03  1.2730E 02  1.5850E-03
 87   .7583  180.0    523.59  [illegible]  1.2146E 00  1.5808E-03  6.3718E-03  1.2560E 02  1.2066E-03
 88   .7996  180.0    525.80  5.8172E 00  1.5154E 00  1.9779E-03  7.9739E-03  1.2612E 02  1.5096E-03
 89   .8409  180.0    527.27  6.1501E 00  1.5714E 00  2.0549E-03  8.2841E-03  1.2647E 02  1.5683E-03
 90   .8822  180.0    529.00  6.4256E 00  1.4807E 00  1.9407E-03  7.8229E-03  1.2688E 02  1.4810E-03
 91   .9235  180.0    531.17  6.3668E 00  1.5627E 00  2.0539E-03  8.2779E-03  1.2739E 02  1.5671E-03
 92   .9648  180.0    537.20  6.7879E 00  1.5642E 00  2.0724E-03  8.3500E-03  1.2883E 02  1.5808E-03
 93   .8822  225.0    530.69  5.4926E 00  1.4034E 00  1.8435E-03  7.4303E-03  1.2729E 02  1.4066E-03
 94   .9648  225.0    537.06  5.7909E 00  1.3926E 00  1.8467E-03  7.4402E-03  1.2889E 02  1.4085E-03
 95   .7170  270.0    534.31  5.0757E 00  1.3698E 00  1.8079E-03  7.2855E-03  1.2815E 02  1.3792E-03
 96   .7996  270.0    531.07  4.4589E 00  1.3164E 00  1.7324E-03  6.9822E-03  1.2757E 02  1.3218E-03
 97   .8822  270.0    534.57  5.0814E 00  1.2877E 00  1.6734E-03  6.7438E-03  1.2817E 02  1.2766E-03
 98   .9644  270.0    519.29  5.1291E 00  1.2334E 00  1.6307E-03  6.6019E-03  1.2933E 02  1.2490E-03
```

OF ASYMMETRIC R M TEST
HEAT TRANSFER PHASE
GROUP 23 SYM PH X1 SYM PH X2
MACH NO 8


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 23
MACH NO = 8
RE NO =2.17 X 10**6
CONFIG 1
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.85
0.95
32.00
24.00
16.00
8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
16.00
X 10**4
X 10**4

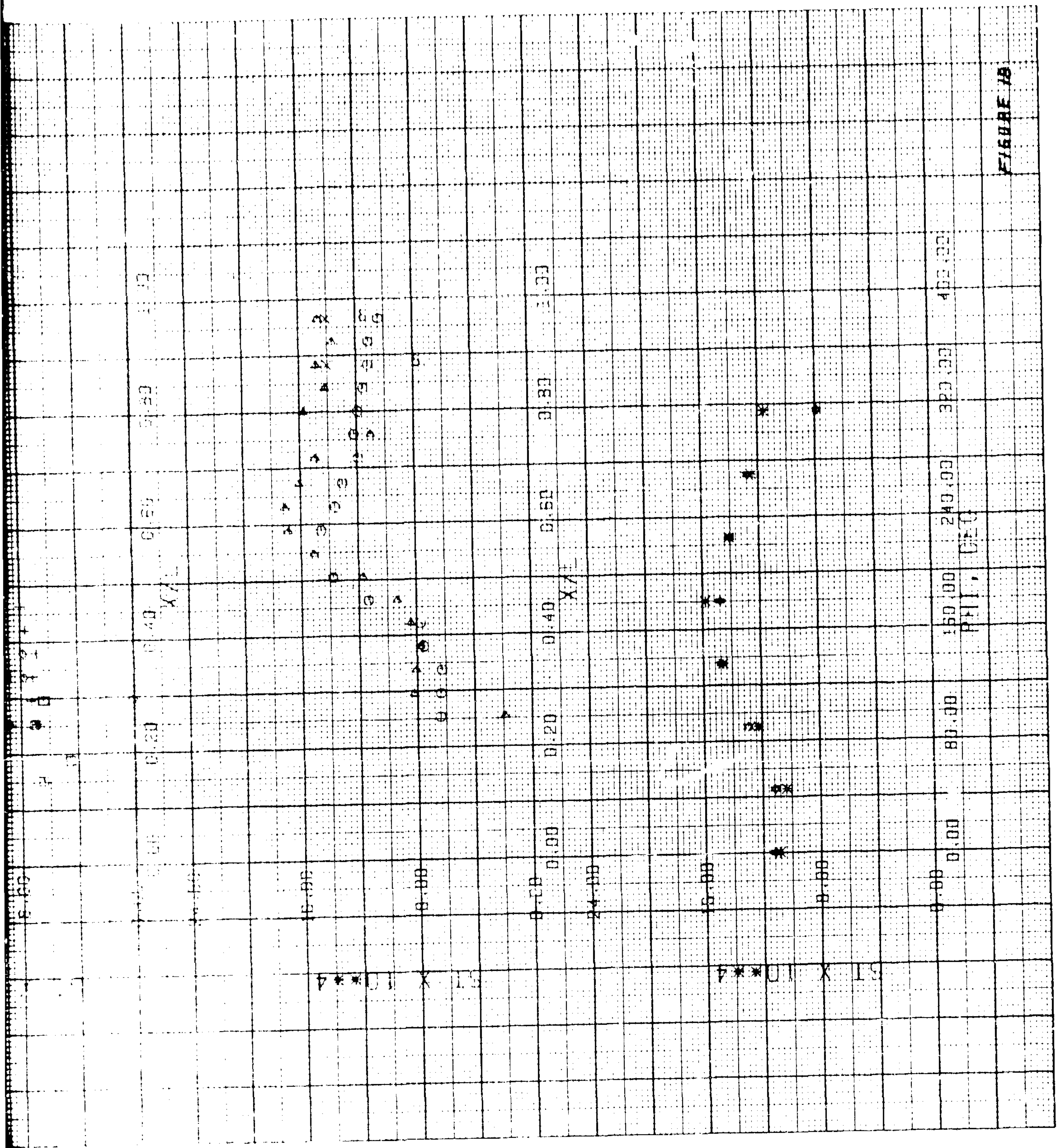


FIGURE 18
0.00
80.00
160.00
240.00
320.00
400.00
PHI, DEG
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
8.00
16.00
24.00
ST X 10**4

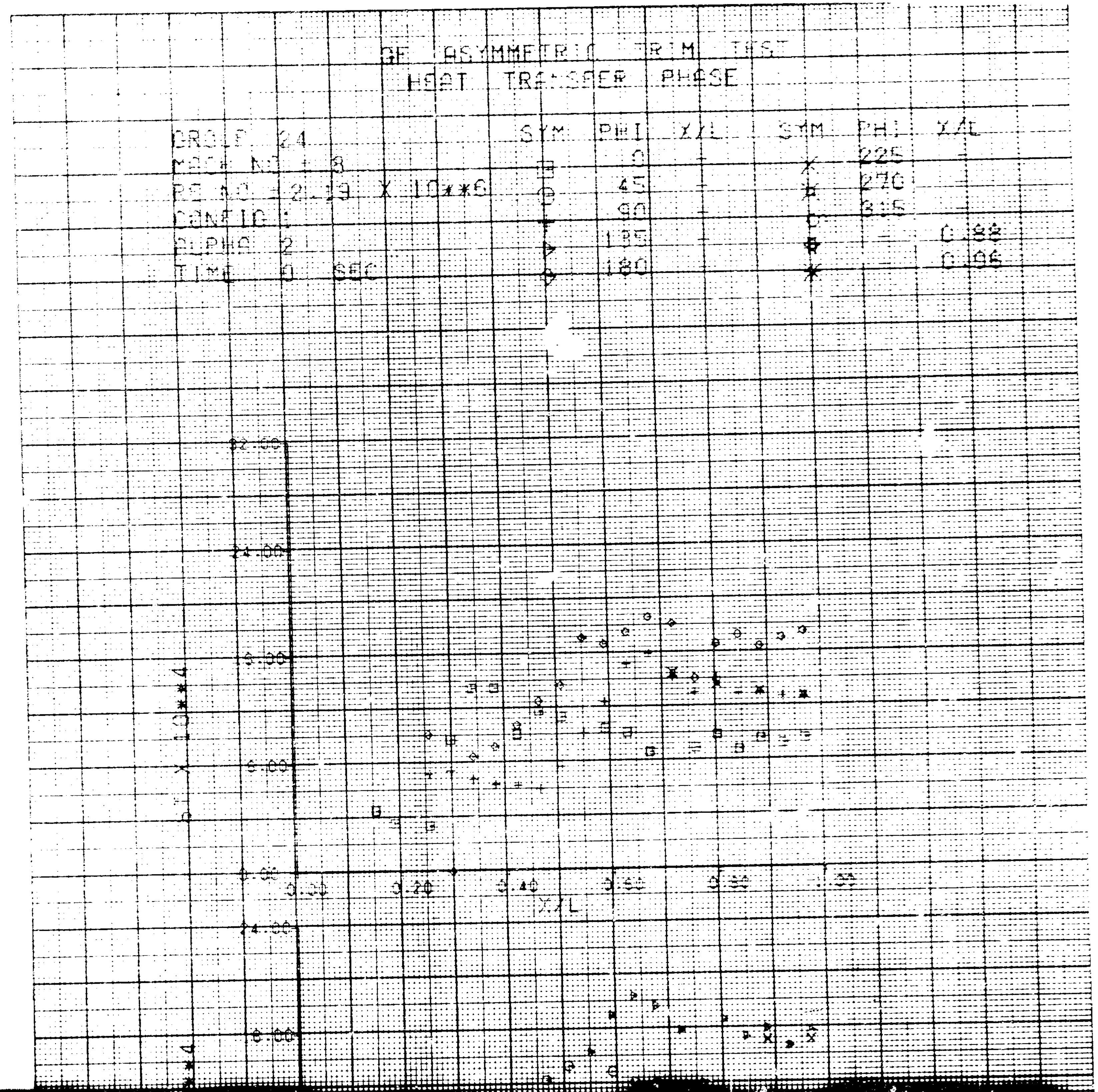
Figure 18

```
                                              7/16/79

                              AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                               VON KARMAN GAS DYNAMICS FACILITY
                                 50 INCH HYPERSONIC TUNNEL B
                                         VT0967-800
GROUP   CONFIG     ALPHA-M       BETA-M        ALPHA-S      ROLL    ALP-P   DATE       MACH NO        PO          TO          TIME
 24       1          2.09            0           2.09          0       0    716         7.59        476.17     1266.67         .08
   T-INF          P-INF          Q-INF          V-INF         RHO-INF        MU-INF         RE/FT          RE/D          HO
 9.3690E 01   4.0574E-02   2.1761E 00   3.7077E 03   4.3839E-05   7.5396E-08   2.1084E 06   2.0874E 06   3.1533E 02

TC NO    X/L      PHI     TEMP     SLOPE        Q-DOT          HT            HM            HW          ST

   1   .1900       0     457.01  2.7982E 00  9.9950E-01  8.8871E-04  2.4314E-03  1.0986E 02  4.5827E-04
   2   .1067       0     465.20  1.7736E 00  3.8952E-01  4.7302E-04  1.9117E-03  1.1177E 02  3.6067E-04
   3   .2524       0     473.90  1.7345E 00  3.6492E-01  4.4794E-04  1.8113E-03  1.1346E 02  3.4138E-04
   4   .2943       0     483.41  3.7691E 00  1.0364E 00  1.2814E-03  5.1749E-03  1.1607E 02  9.7664E-04
   5   .3363       0     490.09  4.9141E 00  1.4244E 00  1.7041E-03  7.2079E-03  1.1764E 02  1.3585E-03
   6   .3783       0     494.41  4.7114E 00  1.4163E 00  1.7831E-03  7.2025E-03  1.1803E 02  1.3574E-03
   7   .4203       0     495.98  3.6361E 00  1.0565E 00  1.3328E-03  5.3811E-03  1.1903E 02  1.0149E-03
   8   .4623       0     500.02  4.4517E 00  1.2200E 00  1.5561E-03  6.2834E-03  1.2010E 02  1.1842E-03
   9   .5043       0     502.41  4.3582E 00  1.1769E 00  1.4988E-03  6.0434E-03  1.2057E 02  1.1390E-03
  10   .5463       0     531.37 -9.9107E-07 -2.7860E-07 -3.6719E-10 -1.4802E-09  1.2745E 02 -2.7897E-10
  11   .5882       0     508.19  3.9034E 00  1.0759E 00  1.3780E-03  5.5620E-03  1.2194E 02  1.0483E-03
  12   .6302       0     512.56  3.4594E 00  1.0417E 00  1.3387E-03  5.4027E-03  1.2250E 02  1.0182E-03
  13   .6722       0     517.94  3.4242E 00  8.8280E-01  1.1440E-03  4.6154E-03  1.2402E 02  8.6984E-04
  14   .8822   315.0     531.29  2.8347E 00  7.3844E-01  9.7994E-04  3.9103E-03  1.2743E 02  7.4073E-04
  15   .7583       0     518.28  3.7450E 00  9.1022E-01  1.   15E-03  4.7842E-03  1.2434E 02  8.9427E-04
  16   .7996       0     519.96  3.9796E 00  1.0843E 00  1.3065E-03  5.2698E-03  1.2474E 02  9.9318E-04
  17   .8409       0     520.19  3.4824E 00  8.8979E-01  1.1579E-03  4.6703E-03  1.2479E 02  8.8020E-04
  18   .8822       0     522.09  3.8703E 00  9.6954E-01  1.2661E-03  5.1060E-03  1.2542E 02  9.6232E-04
  19   .9235       0     523.86  3.7183E 00  9.3150E-01  1.2180E-03  4.9117E-03  1.2566E 02  9.2576E-04
  20   .9648       0     526.09  3.8844E 00  9.5934E-01  1.2627E-03  5.0906E-03  1.2685E 02  9.5941E-04
  21   .2524    45.0     461.58  2.2154E 00  6.5490E-01  7.9181E-04  3.2040E-03  1.1091E 02  6.0385E-04
  22   .2943    45.0     466.38  2.2249E 00  6.4923E-01  7.8954E-04  3.1940E-03  1.1205E 02  6.0197E-04
  23   .3363    45.0     472.57  2.4883E 00  7.4799E-01  9.1650E-04  3.7084E-03  1.1350E 02  6.9853E-04
  24   .3783    45.0     477.58  3.0610E 00  9.1436E-01  1.1273E-03  4.5577E-03  1.1469E 02  8.5898E-04
  25   .4203    45.0     483.47  3.6761E 00  1.0894E 00  1.2537E-03  5.0688E-03  1.1609E 02  9.5493E-04
  26   .4623    45.0     490.44  4.6373E 00  1.3011E 00  1.6300E-03  6.5845E-03  1.1773E 02  1.2411E-03
  27   .5043    45.0     495.37  5.7454E 00  1.3942E 00  1.7624E-03  7.1185E-03  1.1889E 02  1.3416E-03
 100   .9648   315.0     536.15  4.1048E 00  9.8713E-01  1.3118E-03  5.2845E-03  1.2858E 02  9.9634E-04
  29   .5882    45.0     501.18  4.8780E 00  1.3440E 00  1.7067E-03  6.8913E-03  1.2028E 02  1.2988E-03
  30   .6302    45.0     504.19  4.4418E 00  1.2554E 00  1.6008E-03  6.4626E-03  1.2099E 02  1.2180E-03
  31   .6722    45.0     516.51  4.9919E 00  1.2254E 00  1.5829E-03  6.3868E-03  1.2345E 02  1.2037E-03
  32   .7170    45.0     518.07  4.7269E 00  1.1131E 00  1.4460E-03  5.8331E-03  1.2448E 02  1.0993E-03
  33   .7583    45.0     513.91  4.1557E 00  1.1450E 00  1.4779E-03  5.9634E-03  1.2330E 02  1.1239E-03
  34   .7996    45.0     515.68  3.9988E 00  1.1220E 00  1.4515E-03  5.8562E-03  1.2372E 02  1.1037E-03
  35   .8409    45.0     518.42  3.9925E 00  1.0801E 00  1.4023E-03  5.6549E-03  1.2437E 02  1.0661E-03
  36   .8822    45.0     520.27  3.9815E 00  1.0472E 00  1.3629E-03  5.4973E-03  1.2481E 02  1.0361E-03
  37   .9235    45.0     521.81  4.1844E 00  1.0487E 00  1.3672E-03  5.5142E-03  1.2513E 02  1.0392E-03
  38   .9648    45.0     528.31  3.9547E 00  9.5101E-01  1.2507E-03  5.0427E-03  1.2672E 02  9.5039E-04
  39   .2524    90.0     457.34  2.6573E 00  7.8551E-01  9.4491E-04  3.8244E-03  1.0992E 02  7.2078E-04
  40   .2943    90.0     461.16  2.9171E 00  8.0705E-01  9.7528E-04  3.9465E-03  1.1082E 02  7.4379E-04
  41   .3363    90.0     468.66  2.7200E 00  7.3226E-01  8.9300E-04  3.6171E-03  1.1259E 02  6.8076E-04
  42   .3783    90.0     474.64  2.1756E 00  6.8660E-01  8.4396E-04  3.4110E-03  1.1400E 02  6.4287E-04
  43   .4203    90.0     481.87  2.7641E 00  6.6930E-01  8.2872E-04  3.3408E-03  1.1551E 02  6.3133E-04
  44   .4623    90.0     485.36  2.0515E 00  6.3729E-01  7.9334E-04  3.2061E-03  1.1653E 02  6.0424E-04
  45   .5043    90.0     490.44  2.9318E 00  8.0781E-01  1.0121E-03  4.0888E-03  1.1774E 02  7.7060E-04
  46   .5463    90.0     496.91  3.7041E 00  1.0578E 00  1.3353E-03  5.3931E-03  1.1917E 02  1.0164E-03
  47   .5882    90.0     499.87  4.5947E 00  1.2892E 00  1.6344E-03  6.5996E-03  1.1997E 02  1.2438E-03
  48   .6302    90.0     502.89  5.7108E 00  1.5735E 00  2.0025E-03  8.0847E-03  1.2066E 02  1.5237E-03
  49   .6722    90.0     513.26  6.5216E 00  1.6338E 00  2.1078E-03  8.5019E-03  1.2314E 02  1.6023E-03
  50   .7170    90.0     518.66  6.1284E 00  1.4432E 00  1.8742E-03  7.5605E-03  1.2443E 02  1.4249E-03
  51   .7583    90.0     510.77  5.1301E 00  1.3364E 00  1.7179E-03  6.9330E-03  1.2255E 02  1.3066E-03
  52   .7996    90.0     513.41  5.5383E 00  1.4427E 00  1.8610E-03  7.5091E-03  1.2318E 02  1.4152E-03
  53   .8409    90.0     515.24  5.2728E 00  1.3209E 00  1.7070E-03  6.8909E-03  1.2362E 02  1.2987E-03
  54   .8822    90.0     517.78  5.3848E 00  1.3210E 00  1.7165E-03  6.9164E-03  1.2420E 02  1.3035E-03
  55   .9235    90.0     518.68  5.3598E 00  1.2889E 00  1.6739E-03  6.7525E-03  1.2443E 02  1.2726E-03
  56   .9648    90.0     524.75  5.3116E 00  1.2773E 00  1.6721E-03  6.7428E-03  1.2587E 02  1.2738E-03
  57   .2524   135.0     452.89  8.9278E-01  2.6391E-01  3.1577E-04  1.2784E-03  1.0887E 02  2.4093E-04
  58   .2943   135.0     459.41  3.1552E 00  1.0116E 00  1.2199E-03  4.9369E-03  1.1040E 02  9.3044E-04
  59   .3363   135.0     467.68  2.8713E 00  9.0626E-01  1.1039E-03  4.4653E-03  1.1236E 02  8.4157E-04
  60   .3783   135.0     474.20  2.7945E 00  8.6810E-01  1.0658E-03  4.3099E-03  1.1389E 02  8.1228E-04
  61   .4203   135.0     479.89  3.0083E 00  9.0431E-01  1.1181E-03  4.5149E-03  1.1524E 02  8.5185E-04
  62   .4623   135.0     485.59  3.2263E 00  9.3744E-01  1.1673E-03  4.7173E-03  1.1659E 02  8.8906E-04
  63   .5043   135.0     490.87  4.4497E 00  1.1370E 00  1.4251E-03  5.7575E-03  1.1784E 02  1.0851E-03
  64   .5463   135.0     495.16  5.6533E 00  1.5012E 00  1.8919E-03  7.6415E-03  1.1885E 02  1.4402E-03
  65   .5882   135.0     499.92  6.6796E 00  1.7738E 00  2.2488E-03  9.0809E-03  1.1998E 02  1.7114E-03
  66   .6302   135.0     502.71  7.2038E 00  1.9130E 00  2.4339E-03  9.8267E-03  1.2064E 02  1.8520E-03
  67   .6722   135.0     513.88  7.5360E 00  1.8123E 00  2.3390E-03  9.4379E-03  1.2329E 02  1.7787E-03
  68   .7170   135.0     517.41  6.4644E 00   .6165E 00  2.0959E-03  8.4553E-03  1.2413E 02  1.5935E-03
  69   .7583   135.0     509.80  4.3970E 00  1.2337E 00  1.5840E-03  6.3927E-03  1.2232E 02  1.2048E-03
  70   .7996   135.0     514.83  5.8547E 00  1.7011E 00  2.1983E-03  8.8607E-03  1.2352E 02  1.6716E-03
  71   .8409   135.0     516.84  5.6973E 00  1.5698E 00  2.0339E-03  8.2054E-03  1.2400E 02  1.5464E-03
  72   .8822   135.0     518.69  6.0120E 00  1.6265E 00  2.1122E-03  8.5206E-03  1.2442E 02  1.6058E-03
  73   .9235   135.0     520.07  6.0907E 00  1.4951E 00  1.9452E-03  7.8462E-03  1.2476E 02  1.4787E-03
  74   .9648   135.0     527.59  6.5902E 00  1.5848E 00  2.0823E-03  8.3958E-03  1.2655E 02  1.5823E-03
  75   .2524   180.0     460.78  3.8027E 00  1.1049E 00  1.3346E-03  5.4007E-03  1.1073E 02  1.0179E-03
  76   .2943   180.0    -116.76  6.1927E-08  1.9855E-08  1.4127E-11  5.9031E-11 -2.1035E 01  1.1125E-11
  77   .3363   180.0     476.72  3.0601E 00  9.0459E-01  1.1141E-03  4.5045E-03  1.1449E 02  8.4894E-04
  78   .3783   180.0     483.07  3.2379E 00  9.7333E-01  1.2082E-03  4.8830E-03  1.1598E 02  9.2029E-04
  79   .4203   180.0     488.76  3.8408E 00  1.1356E 00  1.4194E-03  5.7350E-03  1.1734E 02  1.0808E-03
  80   .4623   180.0     494.26    .5995E 00  1.3105E 00  1.6498E-03  6.6641E-03  1.1864E 02  1.2560E-03
  81   .5043   180.0     499.58  5.6876E 00  1.4249E 00  1.8057E-03  7.2917E-03  1.1990E 02  1.3742E-03
  82   .5463   180.0     504.23  6.6907E 00  1.7767E 00  2.2650E-03  9.1438E-03  1.2100E 02  1.7233E-03
  83   .5882   180.0     508.08  6.4734E 00  1.7190E 00  2.2022E-03  8.8887E-03  1.2192E 02  1.6752E-03
  84   .6302   180.0     512.14   .7662E 00  1.7968E 00  2.3139E-03  9.3372E-03  1.2288E 02  1.7597E-03
  85   .6722   180.0     522.91  7.8475E 00  1.8872E 00  2.4645E-03  9.9394E-03  1.2544E 02  1.8732E-03
  86   .7170   180.0     527.09  7.7438E 00  1.8236E 00  2.3945E-03  9.6547E-03  1.2643E 02  1.8196E-03
  87   .7583   180.0     519.56  5.9515E 00  1.4312E 00  1.8607E-03  7.5057E-03  1.2463E 02  1.4146E-03
  88   .7996   180.0     524.11  6.4492E 00  1.6800E 00  2.1974E-03  8.8613E-03  1.2572E 02  1.6701E-03
  89   .8409   180.0     526.20  6.7992E 00  1.7373E 00  2.2785E-03  9.1873E-03  1.2622E 02  1.7315E-03
  90   .8822   180.0     527.85  7.1630E 00  1.6508E 00  2.1698E-03  8.7485E-03  1.2661E 02  1.6488E-03
  91   .9235   180.0     529.77  6.8472E 00  1.7853E 00  2.2476E-03  9.0586E-03  1.2706E 02  1.70 2E-03
  92   .9648   180.0     535.40  7.4374E 00  1.7369E 00  2.3058E-03  9.2931E-03  1.2841E 02  1.7514E-03
  93   .8822   225.0     530.16  5.4408E 00  1.5179E 00  2.0012E-03  8.0675E-03  1.2716E 02  1.5204E-03
  94   .9648   225.0     536.45  6.2717E 00  1.5082E 00  2.0050E-03  8.0803E-03  1.2866E 02  1.5229E-03
  95   .7170   270.0     533.44  6.4181E 00  1.4470E 00  1.9160E-03  7.7226E-03  1.2791E 02  1.4554E-03
  96   .7996   270.0     532.87  5.1360E 00  1.3639E 00  1.8045E-03  7.2737E-03  1.2781E 02  1.3709E-03
  97   .8822   270.0     534.95  5.8980E 00  1.3076E 00  1.7242E-03  6.9642E-03  1.2836E 02  1.3127E-03
  98   .9648   270.0     530.24  5.2574E 00  1.2643E 00  1.6848E-03  6.7898E-03  1.2908E 02  1.2795E-03
```

GE ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

GROUP 24   SYM PHI   X/L   SYM PHI


GE ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

2

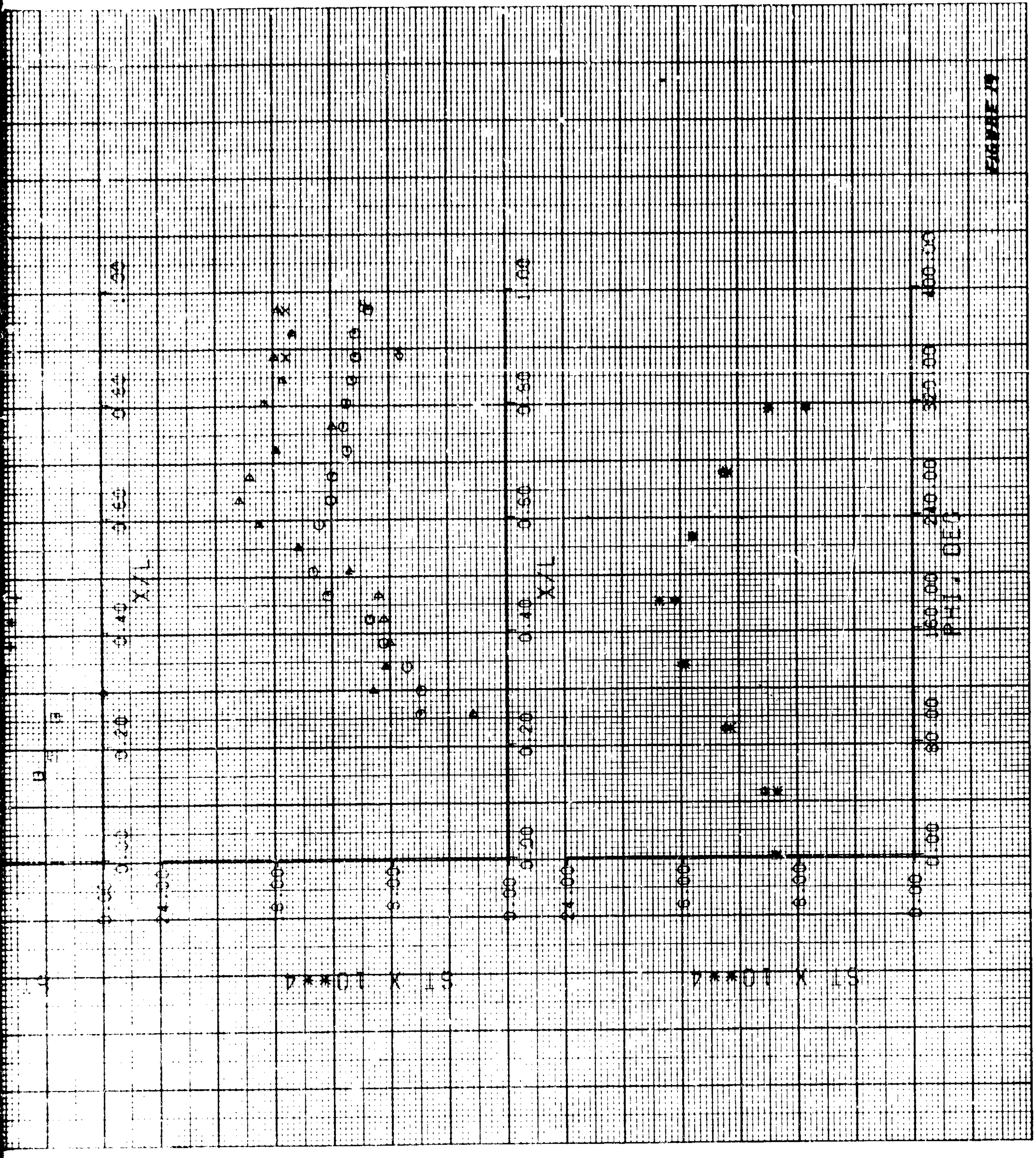
FIGURE 19
X/L
0.00
0.20
0.40
0.60
0.80
1.00
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
ST X 10**4
ST X 10**4

Figure 19

```
                                         7/14/69

                       ARO(ARO,INC.) ARNOLD AFS, TENNESSEE
                       VON KARMAN GAS DYNAMICS FACILITY
                         50 INCH HYPERSONIC TUNNEL B
                                 VT0957-B00
GROUP  CONFIG   ALPHA-M     BETA-M     ALPHA-S    ROLL  ALP-P  DATE    MACH NO      PO         TO         TIME
 25      1       4.12         0         4.12       0      0    714      7.99      470.47    1302.05       .00
  T-INF      P-INF        Q-INF       V-INF      RHO-INF      MU-INF      RE/FT       RE/D        H0
 9.3110E 01 4.0502E-02 2.1710E 00 3.7779E 03 4.3773E-05 7.4969E-08 2.2059E 06 2.0223E 06 3.1359E 02

TC NO   X/L    PHI    T W     SLOPE       Q-STD        HT          HM          HW          ST

  1   .1500     0   503.26  1.9209F 00  3.3192F-01  4.2920E-04  1.7213E-03  1.2877F 02  3.2351F-04
  2   .1867     0   491.01  1.5036E 00  3.6770F-01  4.4011E-04  1.7760E-03  1.1807F 02  3.3427E-04
  3   .2524     0   500.62  1.4230E 00  1.0120F 00  1.2951E-03  5.2312E-03  1.2015E 02  9.0316F-04
  4   .2943     0   515.52  2.1833E 00  8.7050F-01  1.1461E-03  4.6240E-03  1.2300F 02  8.6934E-04
  5   .3363     0   514.25  1.8342E 00  9.5764F-01  1.2473E-03  5.0340E-03  1.2330E 02  9.4621F-04
  6   .3783     0   515.60  2.9600E 00  8.6239F-01  1.1253E-03  4.5410E-03  1.2372E 02  8.5355E-04
  7   .4203     0   514.81  3.1379E 00  6.7930F-01  8.8515E-04  3.5727E-03  1.2347F 02  6.7146F-04
  8   .4623     0   516.53  2.8073E 00  7.7349F-01  1.0104E-03  4.0778E-03  1.2392E 02  7.6640F-04
  9   .5043     0   517.40  2.8809E 00  7.8184F-01  1.0226E-03  4.1260E-03  1.2415F 02  7.7560F-04
 10   .5463     0   779.32 -5.5923E-02 -1.5691F-02 -2.0845E-05 -8.4049E-05  1.2696F 02 -1.5800F-05
 11   .5882     0   521.42  2.6035E 00  7.1735F-01  9.4304E-04  3.8051E-03  1.2508F 02  7.1515F-04
 12   .6302     0   523.44  2.5345E 00  6.8569F-01  9.0387E-04  3.6465E-03  1.2556E 02  6.8533E-04
 13   .6722     0   524.28  2.4559E 00  6.1520F-01  8.1143E-04  3.2744E-03  1.2576F 02  6.1559F-04
 14   .8822   315.0 537.81  2.6791E 00  6.4581F-01  8.6774E-04  3.4960E-03  1.2898F 02  6.5742E-04
 15   .7583     0   530.68  2.6577E 00  6.3911F-01  8.5060E-04  3.4302E-03  1.2728F 02  6.4469E-04
 16   .7996     0   532.86  2.5565E 00  6.6110F-01  8.8158E-04  3.5549E-03  1.2781E 02  6.6811E-04
 17   .8409     0   532.17  2.3295E 00  5.9522F-01  7.9375E-04  3.2007E-03  1.2764F 02  6.0155E-04
 18   .8822     0   534.86  2.4511E 00  6.1405F-01  8.2178E-04  3.3113E-03  1.2827F 02  6.2270E-04
 19   .9235     0   535.72  2.4346E 00  6.0992F-01  8.1722E-04  3.2947E-03  1.2848F 02  6.1922E-04
 20   .9648     0   534.64  2.4812E 00  6.4478F-01  8.6271E-04  3.4783E-03  1.2823E 02  6.5372E-04
 21   .2524   45.0  493.12  1.6600E 00  4.9663F-01  6.2949E-04  2.5395E-03  1.1837F 02  4.7560F-04
 22   .2943   45.0  506.54  1.4321E 00  4.5916F-01  5.9200E-04  2.3906E-03  1.2155E 02  4.4934F-04
 23   .3363   45.0  506.72  1.4839E 00  4.4607F-01  5.7533E-04  2.3232E-03  1.2159F 02  4.3662E-04
 24   .3783   45.0  507.56  1.7327E 00  5.2084F-01  6.7249E-04  2.7154E-03  1.2179F 02  5.1036F-04
 25   .4203   45.0  509.66  2.3451E 00  6.8139F-01  8.8217E-04  3.5616E-03  1.2229F 02  6.6938E-04
 26   .4623   45.0  513.95  3.7963E 00  1.0652F 00  1.3867E-03  5.5974E-03  1.2331E 02  1.0520E-03
 27   .5043   45.0  516.68  4.5179E 00  1.1997F 00  1.5675E-03  6.3261E-03  1.2396E 02  1.1889E-03
100   .9648  315.0  540.62  3.1914E 00  8.1556F-01  1.1000E-03  4.4335E-03  1.2965F 02  8.3325E-04
 29   .5882   45.0  519.60  3.9107E 00  1.0775F 00  1.4132E-03  5.7025E-03  1.2465F 02  1.0717E-03
 30   .6302   45.0  522.11  3.6794E 00  9.9541F-01  1.3099E-03  5.2847E-03  1.2525E 02  9.9322E-04
 31   .6722   45.0  525.75  3.6029E 00  9.5803F-01  1.2667E-03  5.1098E-03  1.2611E 02  9.6036E-04
 32   .7170   45.0  528.78  3.7204E 00  8.7611F-01  1.1631E-03  4.6908E-03  1.2683E 02  8.8160E-04
 33   .7583   45.0  530.40  3.7182E 00  8.8670F-01  1.1797E-03  4.7574E-03  1.2722F 02  8.9411E-04
 34   .7996   45.0  531.48  3.1100E 00  8.7261F-01  1.1626E-03  4.6882E-03  1.2747F 02  8.8111E-04
 35   .8409   45.0  533.74  3.1266E 00  8.4586F-01  1.1304E-03  4.5577E-03  1.2801F 02  8.5658E-04
 36   .8822   45.0  535.77  3.0461E 00  8.0121F-01  1.0736E-03  4.3284E-03  1.2850E 02  8.1348E-04
 37   .9235   45.0  537.38  3.1322E 00  8.0031F-01  1.0749E-03  4.3330E-03  1.2890E 02  8.1435E-04
 38   .9648   45.0  536.03  3.1323E 00  7.5326F-01  1.0108E-03  4.0749E-03  1.2875F 02  7.6584E-04
 39   .2524   90.0  489.88  2.4743E 00  7.3142F-01  9.2331E-04  3.7317E-03  1.1760E 02  7.0135E-04
 40   .2943   90.0  501.46  2.7966E 00  7.3632F-01  9.4329E-04  3.8101E-03  1.2035E 02  7.1607E-04
 41   .3363   90.0  502.88  2.7526E 00  7.1094F-01  9.1248E-04  3.6853E-03  1.2068E 02  6.9263E-04
 42   .3783   90.0  504.86  1.9671E 00  6.2087F-01  7.9887E-04  3.2261E-03  1.2115E 02  6.0633E-04
 43   .4203   90.0  507.36  2.1122E 00  6.2439F-01  8.0598E-04  3.2544E-03  1.2174F 02  6.1165E-04
 44   .4623   90.0  509.15  1.6834E 00  5.2292F-01  6.7656E-04  2.7316E-03  1.2217E 02  5.1338E-04
 45   .5043   90.0  511.70  2.3004E 00  6.3304F-01  8.2200E-04  3.3215E-03  1.2278E 02  6.2426E-04
 46   .5463   90.0  515.69  2.3727E 00  6.7757F-01  8.8413E-04  3.5684E-03  1.2372E 02  6.7065E-04
 47   .5882   90.0  516.90  2.7905E 00  7.8296F-01  1.0233E-03  4.1297E-03  1.2401E 02  7.7614E-04
 48   .6302   90.0  519.75  4.2715E 00  1.1769F 00  1.5439E-03  6.2298E-03  1.2469E 02  1.1708F-03
 49   .6722   90.0  525.33  5.6712E 00  1.4287F 00  1.8775E-03  7.5736E-03  1.2601E 02  1.4234E-03
 50   .7170   90.0  529.72  5.8628E 00  1.3811F 00  1.8358E-03  7.4035E-03  1.2705F 02  1.3916E-03
 51   .7583   90.0  528.64  5.0354E 00  1.3117F 00  1.7411E-03  7.0220E-03  1.2680E 02  1.3197E-03
 52   .7996   90.0  530.38  5.3674E 00  1.3982F 00  1.8601E-03  7.5014E-03  1.2721E 02  1.4098E-03
 53   .8409   90.0  532.10  5.1141E 00  1.2812F 00  1.7084E-03  6.8888E-03  1.2762F 02  1.2947E-03
 54   .8822   90.0  534.91  5.1273E 00  1.2586F 00  1.6846E-03  6.7918E-03  1.2829F 02  1.2765E-03
 55   .9235   90.0  535.86  5.1220E 00  1.2317F 00  1.6507E-03  6.6549E-03  1.2852E 02  1.2507E-03
 56   .9648   90.0  534.07  5.0849E 00  1.2228F 00  1.6348E-03  6.5915E-03  1.2809F 02  1.2388E-03
 57   .2524  135.0  482.25  9.5171E-01  2.8133F-01  3.5175E-04  1.4223E-03  1.1580E 02  2.6730E-04
 58   .2943  135.0  492.98  3.4631E 00  1.1103F 00  1.4072E-03  5.6863E-03  1.1834E 02  1.0687E-03
 59   .3363  135.0  494.96  3.0446E 00  9.6098F-01  1.2209E-03  4.9332E-03  1.1880E 02  9.2716E-04
 60   .3783  135.0  497.14  2.9775E 00  9.2492F-01  1.1784E-03  4.7609E-03  1.1933E 02  8.9477E-04
 61   .4203  135.0  499.43  2.9616E 00  8.9025F-01  1.1375E-03  4.5951E-03  1.1986E 02  8.6362E-04
 62   .4623  135.0  502.99  2.9538E 00  8.5825F-01  1.1016E-03  4.4491E-03  1.2070E 02  8.3618E-04
 63   .5043  135.0  506.30  3.4559E 00  9.0857F-01  1.1712E-03  4.7295E-03  1.2149E 02  8.8887E-04
 64   .5463  135.0  508.79  4.2417E 00  1.1264F 00  1.4565F-03  5.8812E-03  1.2208E 02  1.1053E-03
 65   .5882  135.0  512.29  5.5444E 00  1.4724F 00  1.9129E-03  7.7217E-03  1.2291E 02  1.4512E-03
 66   .6302  135.0  515.36  6.8728E 00  1.8251F 00  2.3805E-03  9.6077E-03  1.2364E 02  1.8057E-03
 67   .6722  135.0  523.51  8.3159E 00  1.9758F 00  2.6048E-03  1.0508E-02  1.2559F 02  1.9750E-03
 68   .7170  135.0  526.57  7.9300E 00  1.8576F 00  2.4724E-03  9.9725E-03  1.2633F 02  1.8743E-03
 69   .7583  135.0  522.56  5.8816E 00  1.4256F 00  1.8773E-03  7.5739E-03  1.2535E 02  1.4235E-03
 70   .7996  135.0  526.98  6.8140E 00  1.9799F 00  2.6221E-03  1.0576E-02  1.2640E 02  1.9877E-03
 71   .8409  135.0  528.93  6.7087E 00  1.8484F 00  2.4544E-03  9.8988E-03  1.2687E 02  1.8604E-03
 72   .8822  135.0  530.60  6.8849E 00  1.8626F 00  2.4787E-03  9.9960E-03  1.2726F 02  1.8787E-03
 73   .9235  135.0  532.05  7.1935E 00  1.7658F 00  2.3544E-03  9.4937E-03  1.2761F 02  1.7843E-03
 74   .9648  135.0  535.11  7.7818E 00  1.8714F 00  2.5054E-03  1.0101E-02  1.2834E 02  1.8984E-03
 75   .2524  180.0  482.57  4.4153E 00  1.2829F 00  1.6047E-03  6.4881E-03  1.1587E 02  1.2194F-03
 76   .2943  180.0 -116.76  6.1927E-08  1.9855F-08  1.4194E-11  5.9373E-11 -2.1036F 01  1.1151E-11
 77   .3363  180.0  498.60  3.4603E 00  1.0253F 00  1.3087E-03  5.2847E-03  1.1967E 02  9.9359F-04
 78   .3783  180.0  501.19  3.6098E 00  1.0851F 00  1.3896E-03  5.6130E-03  1.2028E 02  1.0549F-03
 79   .4203  180.0  504.21  3.9988E 00  1.1821F 00  1.5197E-03  6.1374E-03  1.2100E 02  1.1535E-03
 80   .4623  180.0  507.73  4.2983E 00  1.2275F 00  1.5852E-03  6.4007E-03  1.2183E 02  1.2030E-03
 81   .5043  180.0  511.07  5.0626E 00  1.2603F 00  1.6450E-03  6.6410E-03  1.2262E 02  1.2481E-03
 82   .5463  180.0  514.17  6.3718E 00  1.6920F 00  2.2035E-03  8.8940E-03  1.2336E 02  1.6716E-03
 83   .5882  180.0  516.99  6.9294E 00  1.8401F 00  2.4052E-03  9.7046E-03  1.2403F 02  1.8243F-03
 84   .6302  180.0  521.77  7.6965E 00  2.0438F 00  2.6882E-03  1.0846E-02  1.2517F 02  2.0384E-03
 85   .6722  180.0  530.81  9.4684E 00  2.2770F 00  3.0309E-03  1.2223E-02  1.2732E 02  2.2972E-03
 86   .7170  180.0  534.76  9.6580E 00  2.2273F 00  2.9804E-03  1.2017E-02  1.2825E 02  2.2584E-03
 87   .7583  180.0  529.73  7.2765E 00  1.7499F 00  2.3260E-03  9.3804E-03  1.2706E 02  1.7630E-03
 88   .7996  180.0  534.27  7.9544E 00  2.0721F 00  2.7788E-03  1.1172E-02  1.2813E 02  2.0997E-03
 89   .8409  180.0  535.79  8.6851E 00  2.1629F 00  2.8983E-03  1.1685E-02  1.2850F 02  2.1961E-03
 90   .8822  180.0  537.44  8.9880E 00  2.0647F 00  2.7730E-03  1.1178E-02  1.2890F 02  2.1009E-03
 91   .9235  180.0  538.95  8.8820E 00  2.1999F 00  2.9604E-03  1.1933E-02  1.2925E 02  2.2427E-03
 92   .9648  180.0  541.77  9.6497E 00  2.2237F 00  3.0038E-03  1.2106E-02  1.2992F 02  2.2753F-03
 93   .8822  225.0  538.74  7.0094E 00  1.7910F 00  2.4095E-03  9.7124E-03  1.2920E 02  1.8254E-03
 94   .9648  225.0  542.09  7.7990E 00  1.7793F 00  2.4045E-03  9.6905E-03  1.2999F 02  1.8213E-03
 95   .7170  270.0  538.21  6.2746E 00  1.4146F 00  1.9018E-03  7.6661E-03  1.2908F 02  1.4408F-03
 96   .7996  270.0  540.64  5.1502E 00  1.3697F 00  1.8475E-03  7.4466E-03  1.2966F 02  1.3995E-03
 97   .8822  270.0  542.08  4.9478E 00  1.2642F 00  1.7097E-03  6.8901E-03  1.3012F 02  1.2949F-03
 98   .9648  270.0  542.79  5.7634E 00  1.2657F 00  1.7122E-03  6.9002E-03  1.3017F 02  1.2968F-03
```

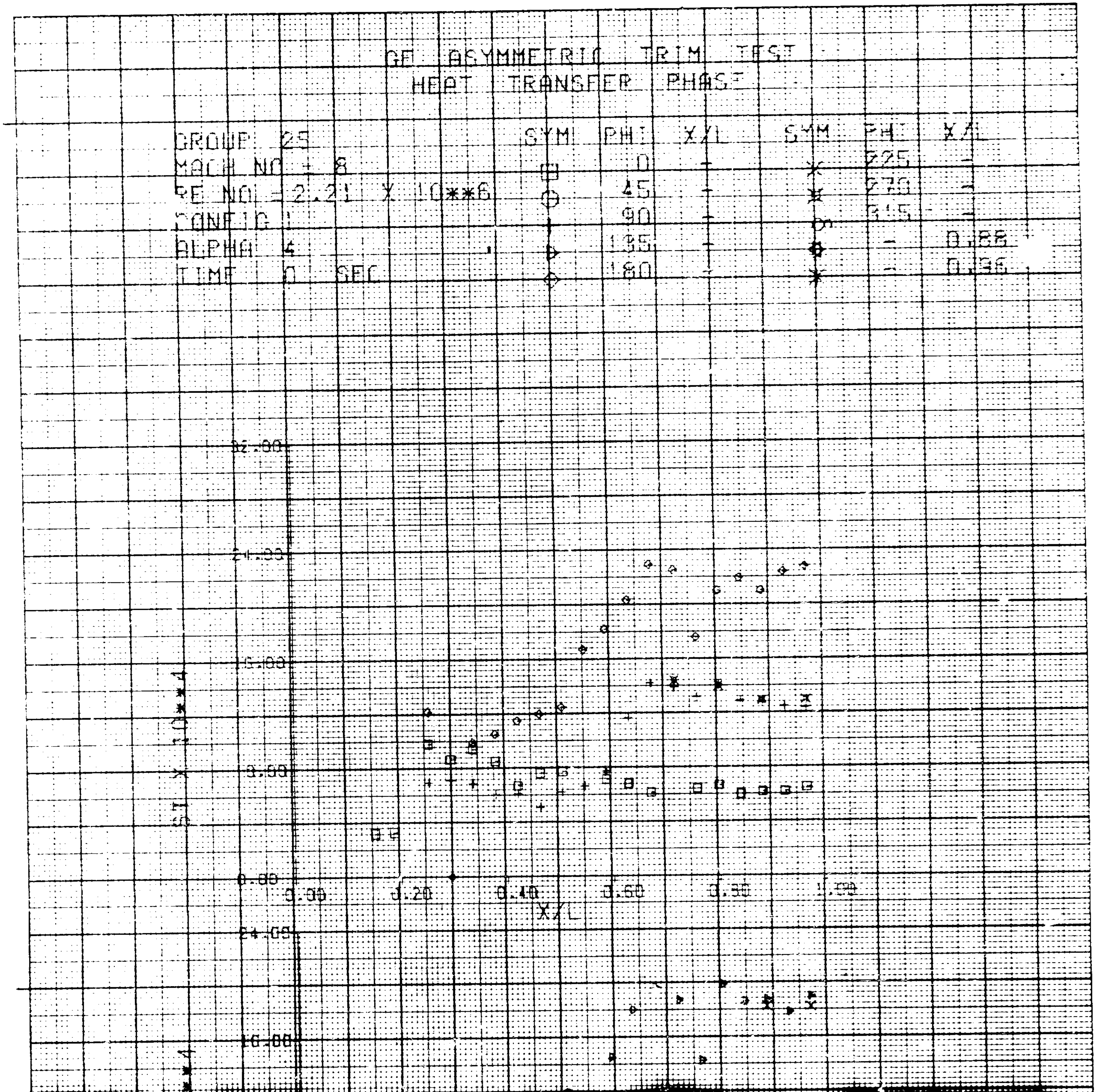
GE ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

SYM PHI X/L SYM PHI X/L

GROUP 25

MACH NO 8


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 25
MACH NO = 8
RE NO = 2.21 X 10**6
CONFIG 1
ALPHA 4
TIME 0 SEC
SYM PHI X/L SYM PHI X/L
0 - 225 -
45 - 270 -
90 - 315 -
135 - - 0.88
180 - - 0.96
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4
24.00
16.00

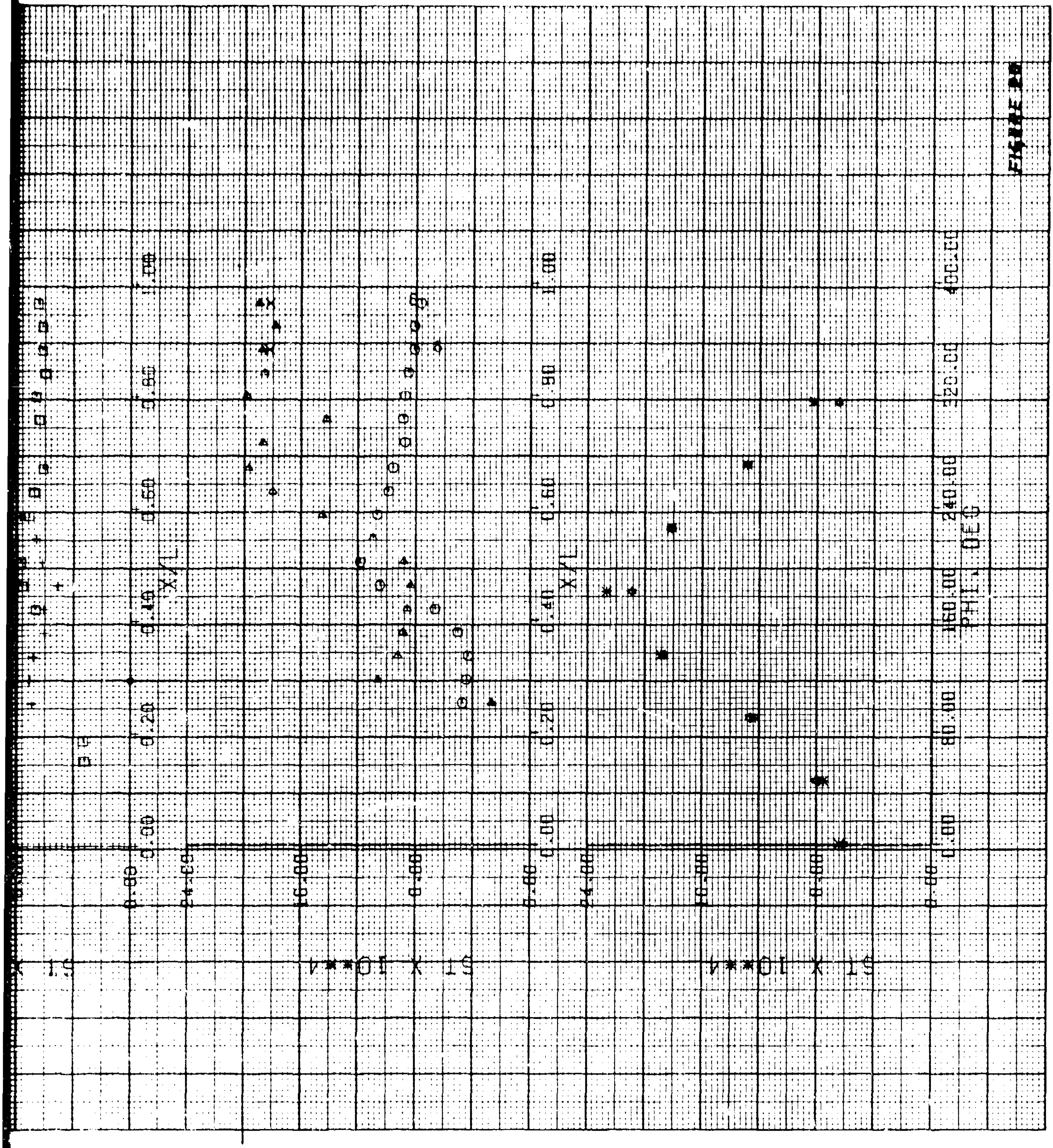


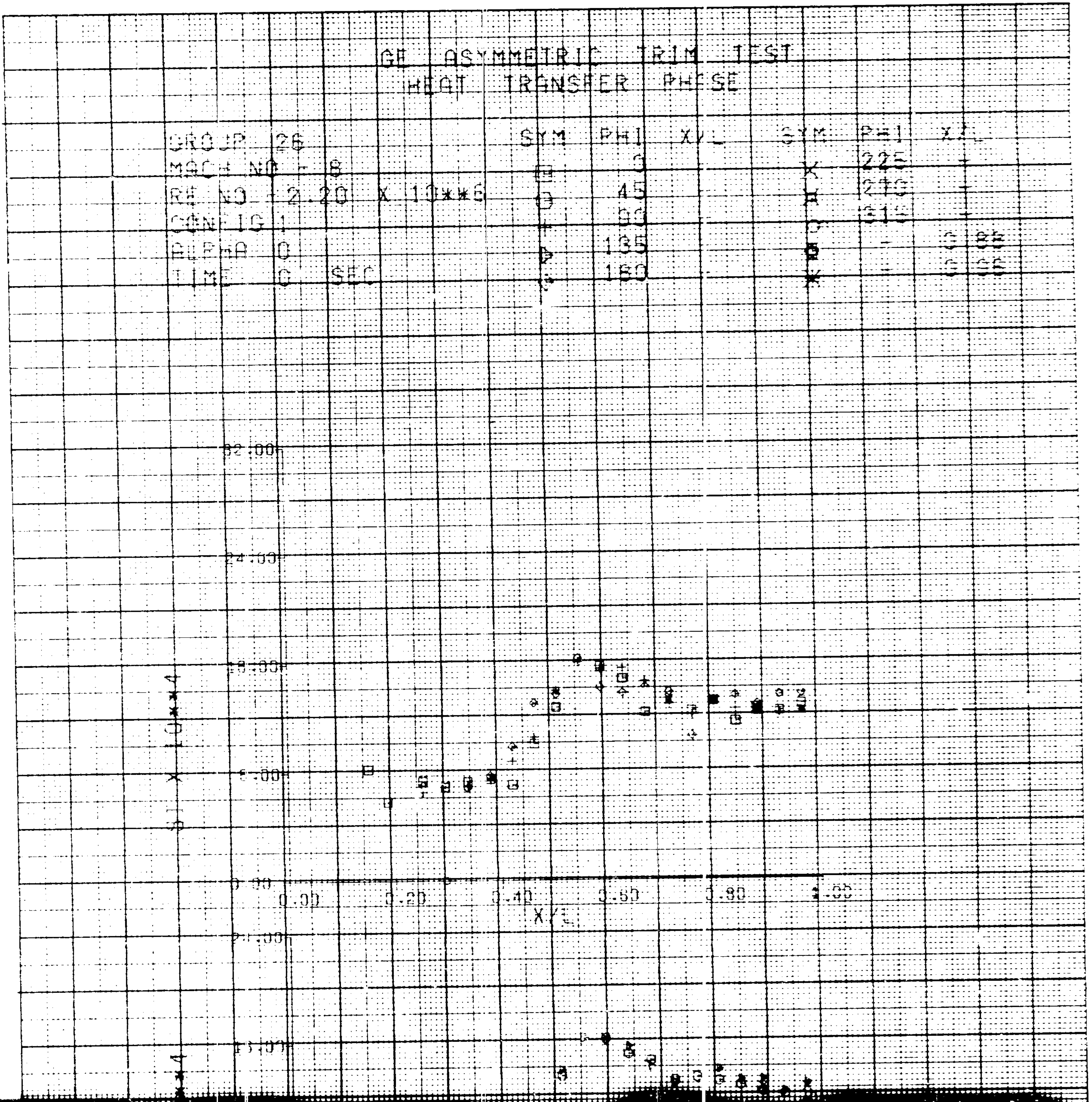
FIGURE 20
X/L
X/L
PHI, DEG
S1 X 10**4
S1 X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
0.00
80.00
160.00
240.00
320.00
400.00
0.00
8.00
16.00
24.00

Figure 20

3

```
                                              7/16/69

                              AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                              VON KARMAN GAS DYNAMICS FACILITY
                                 50 INCH HYPERSONIC TUNNEL B
                                         VT04A7-000
GROUP   CONFIG     ALPHA-M       BETA-M          ALPHA-S       ROLL    ALP-P   DATE       MACH NO         PO            TO              TIME
  26       1          .65           0              .65           0       0      716         7.99         468.97       1283.67            -.00
   T-INF        P-INF        Q-INF        V-INF        RHO-INF        MU-INF        RE/FT          RE/M           NU
9.31920E 01  4.84277E-02  2.16414E 00  3.77948E 03  4.35990E-05  7.50289E-08  2.19624E 06  2.01306E 06  3.13822E 02

TC NO   X/L      PHI     TEMP       SLOPE        Q-STOR          HT           HM           HW           ST

   1   .1900       0    499.09   1.9000E 00   8.6909E-01   1.0863E-03   4.3799E-03   1.1908E 02   8.2014E-04
   2   .1467       0    489.44   2.7423E 00   6.1101E-01   7.6992E-04   3.1117E-03   1.1750E 02   5.8692E-04
   3   .2524       0    487.42   2.6036E 00   7.6965E-01   9.6733E-04   3.9100E-03   1.1702E 02   7.3749E-04
   4   .2943       0    494.74   2.7894E 00   7.2260E-01   9.1663E-04   3.7035E-03   1.1875E 02   6.9056E-04
   5   .3363       0    497.52   2.3961E 00   7.5635E-01   9.6283E-04   3.8896E-03   1.1941E 02   7.3360E-04
   6   .3783       0    498.96   2.5746E 00   7.7392E-01   9.8701E-04   3.9870E-03   1.1975E 02   7.5202E-04
   7   .4203       0    498.56   2.5181E 00   7.3167E-01   9.3265E-04   3.7675E-03   1.1966E 02   7.1062E-04
   8   .4623       0    501.27   3.7520E 00   1.0334E 00   1.3223E-03   5.3408E-03   1.2030E 02   1.0074E-03
   9   .5043       0    502.86   4.8303E 00   1.3090E 00   1.6777E-03   6.7755E-03   1.2068E 02   1.2780E-03
  10   .5463       0    513.31   8.4830E-02   2.1804E-02   3.1748E-05   1.2801E-04   1.2791E 02   2.4145E-05
  11   .5882       0    509.34   5.8206E 00   1.6038E 00   2.0728E-03   8.3682E-03   1.2222E 02   1.5784E-03
  12   .6302       0    514.23   5.9389E 00   1.4985E 00   1.9490E-03   7.8660E-03   1.2330E 02   1.4838E-03
  13   .6722       0    519.91   4.9542E 00   1.2411E 00   1.6263E-03   6.5670E-03   1.2472E 02   1.2377E-03
  14   .8822   315.0    531.24   3.1500E 00   8.2057E-01   1.0915E-03   4.4012E-03   1.2742E 02   8.3015E-04
  15   .7583       0    525.41   5.1594E 00   1.2407E 00   1.6376E-03   6.6054E-03   1.2603E 02   1.2459E-03
  16   .7996       0    525.37   4.6689E 00   1.3100E 00   1.7289E-03   6.9738E-03   1.2602E 02   [illegible]
  17   .8409       0    525.17   4.4432E 00   1.1608E 00   1.5317E-03   6.1782E-03   1.2597E 02   1.1653E-03
  18   .8822       0    528.77   4.9200E 00   1.2326E 00   1.6340E-03   6.5900E-03   1.2683E 02   1.2430E-03
  19   .9235       0    529.95   4.9032E 00   1.2283E 00   1.6310E-03   6.5773E-03   1.2711E 02   1.2406E-03
  20   .9648       0    529.56   5.1250E 00   1.2806E 00   1.6995E-03   6.8534E-03   1.2702E 02   1.2927E-03
  21   .2524    45.0    485.99   2.9688E 00   7.5937E-01   9.5264E-04   3.8511E-03   1.1668E 02   7.2639E-04
  22   .2943    45.0    492.95   2.7232E 00   7.1279E-01   9.0213E-04   3.6453E-03   1.1833E 02   6.8757E-04
  23   .3363    45.0    495.63   2.1092E 00   6.9416E-01   8.8153E-04   3.5616E-03   1.1896E 02   6.7170E-04
  24   .3783    45.0    497.06   2.4985E 00   7.5103E-01   9.5551E-04   3.8601E-03   1.1930E 02   7.2810E-04
  25   .4203    45.0    497.81   2.6344E 00   7.6545E-01   9.7378E-04   3.9340E-03   1.1929E 02   7.4282E-04
  26   .4623    45.0    499.91   3.5240E 00   1.0168E 00   1.2986E-03   5.2444E-03   1.1998E 02   9.8920E-04
  27   .5043    45.0    502.45   5.2412E 00   1.3918E 00   1.7824E-03   7.2007E-03   1.2058E 02   1.3582E-03
 100   .9648   315.0    534.37   4.9165E 00   1.1823E 00   1.5792E-03   6.3667E-03   1.2816E 02   1.2009E-03
  29   .5882    45.0    506.81   6.0300E 00   1.6615E 00   2.1406E-03   8.6473E-03   1.2162E 02   1.6301E-03
  30   .6302    45.0    512.38   5.6760E 00   1.5356E 00   1.9925E-03   8.0427E-03   1.2294E 02   1.5170E-03
  31   .6722    45.0    521.37   5.9838E 00   1.4688E 00   1.9284E-03   7.7801E-03   1.2507E 02   1.4675E-03
  32   .7170    45.0    524.72   5.5883E 00   1.3160E 00   1.7353E-03   7.0000E-03   1.2587E 02   1.3203E-03
  33   .7583    45.0    523.19   4.8557E 00   1.3379E 00   1.7606E-03   7.1027E-03   1.2550E 02   1.3397E-03
  34   .7996    45.0    522.71   4.6724E 00   1.3110E 00   1.7242E-03   6.9557E-03   1.2539E 02   1.3120E-03
  35   .8409    45.0    524.87   4.7148E 00   1.2755E 00   1.6823E-03   6.7861E-03   1.2590E 02   1.2800E-03
  36   .8822    45.0    527.80   4.4591E 00   1.2255E 00   1.6225E-03   6.5439E-03   1.2660E 02   1.2343E-03
  37   .9235    45.0    529.84   4.6956E 00   1.1998E 00   1.5924E-03   6.4218E-03   1.2704E 02   1.2113E-03
  38   .9648    45.0    529.51   4.7028E 00   1.1309E 00   1.5008E-03   6.0524E-03   1.2701E 02   1.1416E-03
  39   .2524    90.0    489.60   2.7092E 00   6.8263E-01   8.6039E-04   3.4773E-03   1.1755E 02   6.5500E-04
  40   .2943    90.0    495.31   2.2369E 00   7.1719E-01   9.1041E-04   3.6783E-03   1.1889E 02   6.9380E-04
  41   .3363    90.0    496.43   2.7078E 00   7.2841E-01   9.2598E-04   3.7410E-03   1.1915E 02   7.0562E-04
  42   .3783    90.0    495.63   2.4584E 00   7.7595E-01   9.8541E-04   3.9813E-03   1.1896E 02   7.5094E-04
  43   .4203    90.0    495.81   3.0876E 00   9.1273E-01   1.1582E-03   4.6796E-03   1.1882E 02   8.8266E-04
  44   .4623    90.0    494.48   3.5222E 00   1.0941E 00   1.3875E-03   5.6060E-03   1.1869E 02   1.0574E-03
  45   .5043    90.0    495.91   5.2520E 00   1.4471E 00   1.8384E-03   7.4272E-03   1.1903E 02   1.4009E-03
  46   .5463    90.0    496.83   5.8112E 00   1.6595E 00   2.1107E-03   8.5270E-03   1.1925E 02   1.6084E-03
  47   .5882    90.0    500.47   5.7126E 00   1.6028E 00   2.0481E-03   8.2725E-03   1.2011E 02   1.5604E-03
  48   .6302    90.0    506.49   5.7890E 00   1.5951E 00   2.0539E-03   8.2934E-03   1.2154E 02   1.5643E-03
  49   .6722    90.0    518.86   5.8965E 00   1.4772E 00   1.9279E-03   7.7802E-03   1.2400E 02   1.4675E-03
  50   .7170    90.0    521.47   5.5197E 00   1.2998E 00   1.7067E-03   6.8857E-03   1.2509E 02   1.2980E-03
  51   .7583    90.0    515.74   4.7007E 00   1.2245E 00   1.5958E-03   6.4404E-03   1.2373E 02   1.2160E-03
  52   .7996    90.0    515.04   5.0968E 00   1.3277E 00   1.7287E-03   6.9770E-03   1.2357E 02   1.3160E-03
  53   .8409    90.0    516.81   5.0608E 00   1.2678E 00   1.6528E-03   6.6704E-03   1.2388E 02   1.2582E-03
  54   .8822    90.0    519.87   5.1153E 00   1.2557E 00   1.6452E-03   6.6383E-03   1.2471E 02   1.2521E-03
  55   .9235    90.0    522.31   5.0776E 00   1.2211E 00   1.6051E-03   6.4754E-03   1.2529E 02   1.2214E-03
  56   .9648    90.0    522.37   5.1395E 00   1.2359E 00   1.6247E-03   6.5547E-03   1.2531E 02   1.2363E-03
  57   .2524   135.0    484.19   6.1061E-01   1.8050E-01   2.2594E-04   9.1360E-04   1.1625E 02   1.7220E-04
  58   .2943   135.0    488.56   2.4950E 00   7.9995E-01   1.0068E-03   4.0694E-03   1.1729E 02   7.6757E-04
  59   .3363   135.0    488.17   2.5319E 00   7.9916E-01   1.0054E-03   4.0635E-03   1.1720E 02   7.6645E-04
  60   .3783   135.0    486.66   2.5554E 00   7.9381E-01   9.9673E-04   4.0290E-03   1.1684E 02   7.5994E-04
  61   .4203   135.0    485.25   3.1491E 00   9.4661E-01   1.1865E-03   4.7964E-03   1.1651E 02   9.0469E-04
  62   .4623   135.0    484.65   4.0282E 00   1.1706E 00   1.4659E-03   5.9262E-03   1.1637E 02   1.1170E-03
  63   .5043   135.0    485.58   5.7141E 00   1.4600E 00   1.8308E-03   7.4007E-03   1.1658E 02   1.3959E-03
  64   .5463   135.0    486.25   6.4195E 00   1.7047E 00   2.1394E-03   8.6480E-03   1.1674E 02   1.6312E-03
  65   .5882   135.0    489.29   6.3389E 00   1.6833E 00   2.1286E-03   8.5707E-03   1.1746E 02   1.6166E-03
  66   .6302   135.0    495.64   6.1213E 00   1.6255E 00   2.0643E-03   8.3462E-03   1.1897E 02   1.5731E-03
  67   .6722   135.0    510.70   5.9873E 00   1.4394E 00   1.8642E-03   7.5254E-03   1.2254E 02   1.4194E-03
  68   .7170   135.0    514.21   5.5568E 00   1.3046E 00   1.7020E-03   6.8693E-03   1.2337E 02   1.2957E-03
  69   .7583   135.0    505.26   3.4310E 00   1.0188E 00   1.3098E-03   5.2891E-03   1.2125E 02   9.9762E-04
  70   .7996   135.0    505.47   4.9016E 00   1.4242E 00   1.8315E-03   7.3958E-03   1.2130E 02   1.3950E-03
  71   .8409   135.0    507.57   4.8810E 00   1.3449E 00   1.7342E-03   7.0019E-03   1.2180E 02   1.3207E-03
  72   .8822   135.0    511.09   4.9582E 00   1.3414E 00   1.7376E-03   7.0143E-03   1.2263E 02   1.3230E-03
  73   .9235   135.0    516.80   5.8457E 00   1.2386E 00   1.6147E-03   6.5163E-03   1.2379E 02   1.2291E-03
  74   .9648   135.0    519.07   5.4014E 00   1.2984E 00   1.7082E-03   6.8602E-03   1.2452E 02   1.2940E-03
  75   .2524   180.0    485.84   2.5438E 00   7.3911E-01   9.2712E-04   3.7470E-03   1.1665E 02   7.0090E-04
  76   .2943   180.0   -116.76  -1.1546E-14  -3.7020E-15  -2.6446E-18  -1.1059E-17  -2.1036E 01  -2.0850E-18
  77   .3363   180.0    489.70   2.4208E 00   7.1561E-01   9.0199E-04   3.6454E-03   1.1756E 02   6.8759E-04
  78   .3783   180.0    488.13   2.6831E 00   8.0653E-01   1.0146E-03   4.1008E-03   1.1719E 02   7.7348E-04
  79   .4203   180.0    487.88   3.4859E 00   1.0305E 00   1.2957E-03   5.2373E-03   1.1711E 02   9.8785E-04
  80   .4623   180.0    488.02   4.7840E 00   1.3662E 00   1.7194E-03   6.9454E-03   1.1716E 02   1.3100E-03
  81   .5043   180.0    488.63   5.7179E 00   1.4324E 00   1.8031E-03   7.2876E-03   1.1731E 02   1.3746E-03
  82   .5463   180.0    489.17   6.4236E 00   1.7058E 00   2.1486E-03   8.6830E-03   1.1743E 02   1.6379E-03
  83   .5882   180.0    491.40   5.9512E 00   1.4741E 00   1.8620E-03   7.5248E-03   1.1796E 02   1.4193E-03
  84   .6302   180.0    499.97   5.3450E 00   1.4194E 00   1.8125E-03   7.3212E-03   1.1999E 02   1.3809E-03
  85   .6722   180.0    515.97   5.0771E 00   1.4376E 00   1.8737E-03   7.5616E-03   1.2378E 02   1.4263E-03
  86   .7170   180.0    519.67   5.0934E 00   1.3878E 00   1.8180E-03   7.3353E-03   1.2467E 02   1.3836E-03
  87   .7583   180.0    509.96   4.4767E 00   1.0760E 00   1.3925E-03   5.6215E-03   1.2236E 02   1.0603E-03
  88   .7996   180.0    508.35   5.1608E 00   1.3444E 00   1.7353E-03   7.0042E-03   1.2198E 02   1.3215E-03
  89   .8409   180.0    509.60   5.3878E 00   1.3766E 00   1.7798E-03   7.1853E-03   1.2228E 02   1.3553E-03
  90   .8822   180.0    513.25   5.6741E 00   1.3075E 00   1.6985E-03   6.8557E-03   1.2314E 02   1.2931E-03
  91   .9235   180.0    518.05   5.5673E 00   1.3668E 00   1.7864E-03   7.2085E-03   1.2428E 02   1.3597E-03
  92   .9648   180.0    523.95   5.0278E 00   1.3660E 00   1.7995E-03   7.2590E-03   1.2568E 02   1.3692E-03
  93   .8822   225.0    513.69   5.6092E 00   1.2799E 00   1.6635E-03   6.7144E-03   1.2325E 02   1.2665E-03
  94   .9648   225.0    523.78   5.7603E 00   1.2602E 00   1.6597E-03   6.6952E-03   1.2566E 02   1.2628E-03
  95   .7170   270.0    528.20   5.8429E 00   1.3173E 00   1.7451E-03   7.0379E-03   1.2669E 02   1.3275E-03
  96   .7996   270.0    523.92   4.9738E 00   1.3208E 00   1.7398E-03   7.0148E-03   1.2568E 02   1.3238E-03
  97   .8822   270.0    526.57   4.8754E 00   1.2457E 00   1.6467E-03   6.6416E-03   1.2631E 02   1.2527E-03
  98   .9648   270.0    530.35   5.1094E 00   1.2205E 00   1.6320E-03   6.5813E-03   1.2721E 02   1.2416E-03
```

GE ASYMMETRIC RUN TEST
HEAT TRANSFER PHASE
GROUP 26 SYM PHI SYM PHI


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 26
MACH NO = 8
RE NO = 2.20 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
□ 0
⬡ 45
+ 90
▷ 135
◇ 180
SYM PHI X/L
X 225
⌑ 270
○ 315
⬢ - 0.86
✱ - 0.96
32.00
24.00
16.00
8.00
0.00
-8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
H X 10**4
16.00
10**4

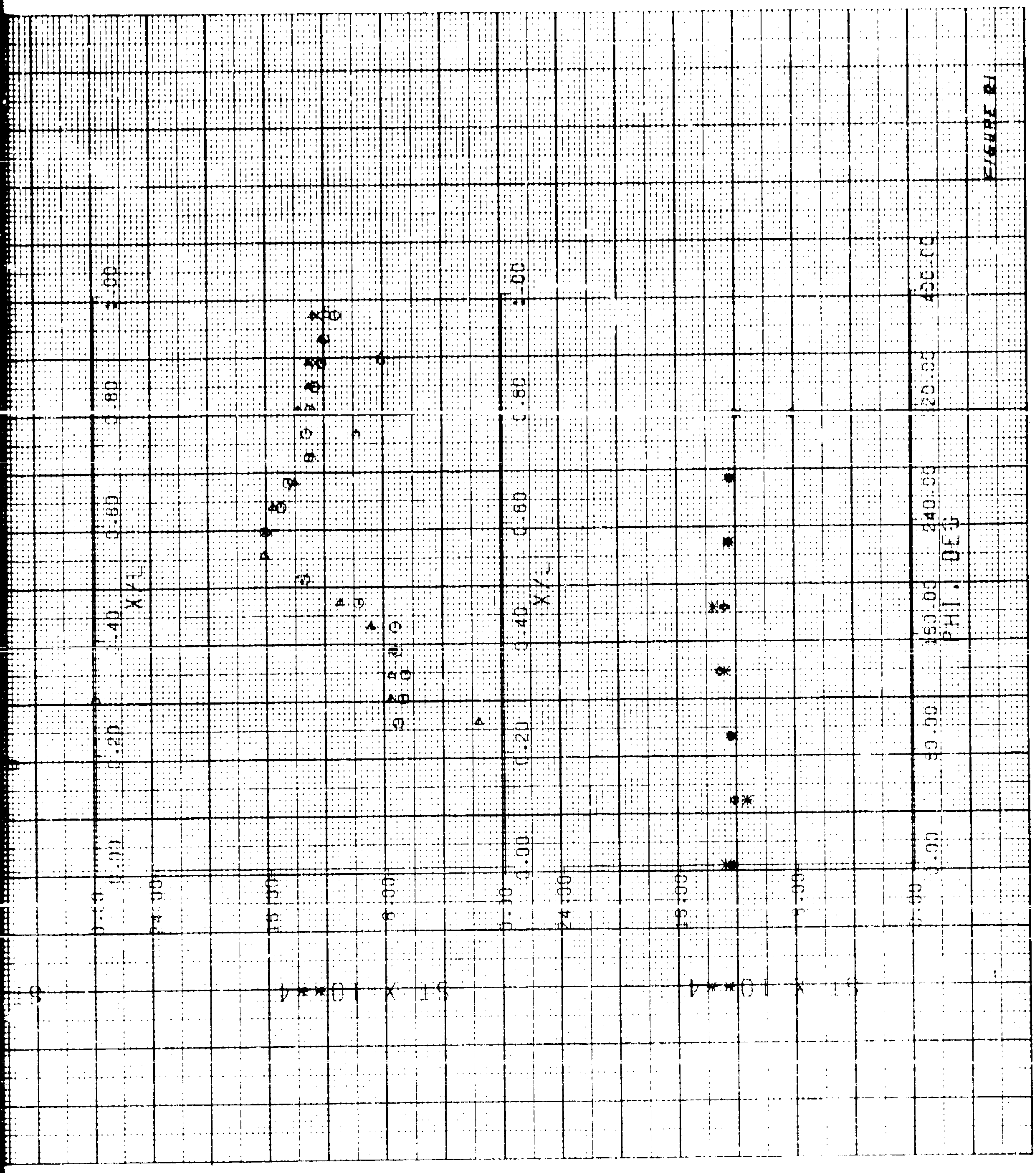


FIGURE 21
PHI , DEG
0.00
80.00
160.00
240.00
320.00
400.00
X/L
0.00
0.20
0.40
0.60
0.80
1.00
0.00
8.00
16.00
24.00
X 10**4

Figure 21

3

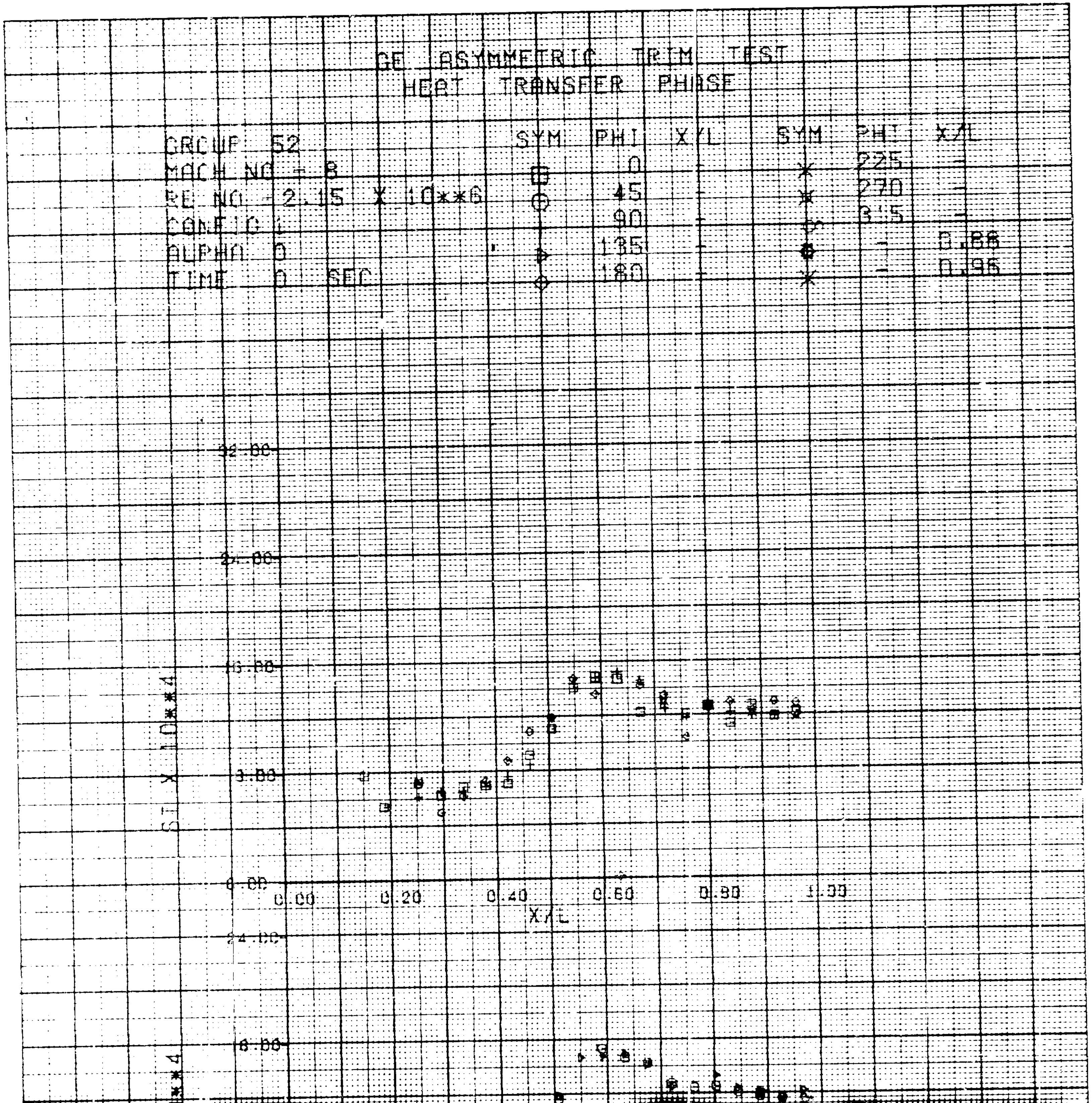
```
                                      7/16/69

                      AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                        VON KARMAN GAS DYNAMICS FACILITY
                          50 INCH HYPERSONIC TUNNEL B
                                  V10967-B00
GROUP   CONFIG   ALPHA-M     BETA-M      ALPHA-S     NULL   ALP-P   DATE    MACH NO      PO          TO         TIME
 52        1        0           0           6          0       0     715      7.99      169.27     1301.63       .00
   T-INF       P-INF        Q-INF       V-INF       RHO-INF      MU-INF       RE/FT        RE/D         HO
9.44401E 01 4.04507E-02 2.10952E 00 3.80672E 03 4.30099E-05 7.41142E-08 2.15001E 06 1.97233E 06 3.18705E 02

TC NO   X/L     PHI     TEMP     SLOPE        Q-STGN        HT           HH           HW          ST

  1    .1515     0     534.07  3.8155E 00  7.8579E-01  1.0258E-03  4.1283E-03  1.2820E 02  7.8370E-04
  2    .1867     0     531.36  2.9437E 00  5.5002E-01  7.2523E-04  2.9214E-03  1.2745E 02  5.5405E-04
  3    .2524     0     532.54  2.6006E 00  7.2975E-01  9.4494E-04  3.8272E-03  1.2776E 02  7.2566E-04
  4    .2943     0     537.56  2.0099E 00  6.3407E-01  8.2906E-04  3.3418E-03  1.2892E 02  6.3445E-04
  5    .3363     0     539.25  2.1007E 00  6.9801E-01  9.0613E-04  3.6408E-03  1.2932E 02  6.9271E-04
  6    .3783     0     540.60  2.3244E 00  6.9872E-01  9.1421E-04  3.6949E-03  1.2966E 02  7.0109E-04
  7    .4203     0     541.21  2.4463E 00  7.1081E-01  9.3476E-04  3.7635E-03  1.2977E 02  7.1452E-04
  8    .4623     0     543.09  3.3130E 00  9.1300E-01  1.2036E-03  4.8455E-03  1.3026E 02  9.1994E-04
  9    .5043     0     543.90  4.0857E 00  1.1054E 00  1.4584E-03  5.8729E-03  1.3045E 02  1.1150E-03
 10    .5463     0     546.95  4.9910E 00  1.4005E 00  1.8559E-03  7.4697E-03  1.3116E 02  1.4182E-03
 11    .5882     0     548.90  5.3449E 00  1.4727E 00  1.9544E-03  7.8736E-03  1.3162E 02  1.4960E-03
 12    .6302     0     550.01  5.3590E 00  1.4490E 00  1.9311E-03  7.7706E-03  1.3208E 02  1.4753E-03
 13    .6722     0     551.96  4.4114E 00  1.2054E 00  1.6079E-03  6.4708E-03  1.3235E 02  1.2284E-03
 94    .8822   315.0   562.01  4.4473E 00  1.1844E 00  1.6016E-03  6.4410E-03  1.3475E 02  1.2229E-03
 15    .7583     0     556.90  4.9199E 00  1.1831E 00  1.5889E-03  6.3915E-03  1.3355E 02  1.2135E-03
 16    .7996     0     558.60  4.4207E 00  1.2404E 00  1.6695E-03  6.7152E-03  1.3395E 02  1.2749E-03
 17    .8409     0     559.04  4.1349E 00  1.1076E 00  1.4916E-03  5.9940E-03  1.3405E 02  1.1391E-03
 18    .8822     0     560.03  4.9375E 00  1.2369E 00  1.6679E-03  6.7085E-03  1.3428E 02  1.2736E-03
 19    .9235     0     559.30  4.6299E 00  1.1599E 00  1.5627E-03  6.2853E-03  1.3412E 02  1.1939E-03
 20    .9648     0     557.28  4.4706E 00  1.1953E 00  1.6059E-03  6.4590E-03  1.3362E 02  1.2264E-03
 21    .2524    45.0   530.18  2.9406E 00  6.9191E-01  8.9609E-04  3.6131E-03  1.2716E 02  6.8598E-04
 22    .2943    45.0   535.34  1.9872E 00  6.3713E-01  8.3148E-04  3.3487E-03  1.2846E 02  6.3577E-04
 23    .3363    45.0   [illegible] [illegible] [illegible] [illegible] [illegible] 1.2891E 02  6.4430E-04
 24    .3783    45.0   539.07  2.5839E 00  6.8655E-01  9.0126E-04  3.6288E-03  1.2947E 02  6.8890E-04
 25    .4203    45.0   540.96  2.7958E 00  6.9613E-01  9.1516E-04  3.6846E-03  1.2973E 02  6.9956E-04
 26    .4623    45.0   544.39  3.1091E 00  8.7236E-01  1.1520E-03  4.6374E-03  1.3055E 02  8.8044E-04
 27    .5043    45.0   547.85  4.3877E 00  1.1652E 00  1.5441E-03  6.2148E-03  1.3118E 02  1.1799E-03
100    .9648   315.0   562.08  6.7051E 00  1.1315E 00  1.5300E-03  6.1570E-03  1.3477E 02  1.1682E-03
 29    .5882    45.0   550.69  5.5433E 00  1.5274E 00  2.0339E-03  8.1846E-03  1.3205E 02  1.5539E-03
 30    .6302    45.0   553.06  5.1825E 00  1.4562E 00  1.9453E-03  7.8269E-03  1.3261E 02  1.4860E-03
 31    .6722    45.0   555.92  5.7464E 00  1.4106E 00  1.8916E-03  7.6097E-03  1.3330E 02  1.4447E-03
 32    .7170    45.0   557.78  5.3443E 00  1.2585E 00  1.6919E-03  6.8058E-03  1.3374E 02  1.2921E-03
 33    .7583    45.0   558.40  4.4487E 00  1.2257E 00  1.6492E-03  6.6337E-03  1.3389E 02  1.2595E-03
 34    .7996    45.0   559.54  4.3923E 00  1.2324E 00  1.6607E-03  6.6796E-03  1.3416E 02  1.2682E-03
 35    .8409    45.0   561.17  4.4084E 00  1.1927E 00  1.6107E-03  6.4778E-03  1.3455E 02  1.2298E-03
 36    .8822    45.0   561.90  4.6149E 00  1.1612E 00  1.5698E-03  6.3130E-03  1.3472E 02  1.1986E-03
 37    .9235    45.0   561.32  4.4459E 00  1.1462E 0   1.5483E-03  6.2266E-03  1.3458E 02  1.1822E-03
 38    .9648    45.0   559.09  4.4627E 00  1.0732E 0   1.4448E-03  5.8193E-03  1.3424E 02  1.1048E-03
 39    .2524    90.0   534.06  2.1106E 00  6.2393E-01  8.1287E-04  3.2748E-03  1.2809E 02  6.2159E-04
 40    .2943    90.0   538.65  2.3457E 00  6.5590E-01  8.5966E-04  3.4610E-03  1.2918E 02  6.5720E-04
 41    .3363    90.0   539.95  2.0744E 00  6.5473E-01  8.5959E-04  3.4610E-03  1.2949E 02  6.5710E-04
 42    .3783    90.0   541.23  2.1780E 00  6.8743E-01  9.0486E-04  3.6398E-03  1.2980E 02  6.9104E-04
 43    .4203    90.0   543.16  2.4649E 00  7.5822E-01  9.9966E-04  4.0242E-03  1.3025E 02  7.6403E-04
 44    .4623    90.0   543.31  2.7055E 00  8.4042E-01  1.1083E-03  4.4610E-03  1.3030E 02  8.4707E-04
 45    .5043    90.0   546.96  4.2784E 00  1.1788E 00  1.5628E-03  6.2896E-03  1.3116E 02  1.1936E-03
 46    .5463    90.0   548.39  4.9916E 00  1.4255E 00  1.8924E-03  7.6183E-03  1.3150E 02  1.4460E-03
 47    .5882    90.0   550.91  5.2058E 00  1.4606E 00  1.9456E-03  7.8283E-03  1.3210E 02  1.4864E-03
 48    .6302    90.0   552.91  5.4231E 00  1.4942E 00  1.9958E-03  8.0301E-03  1.3258E 02  1.5246E-03
 49    .6722    90.0   554.94  5.7161E 00  1.4320E 00  1.9178E-03  7.7149E-03  1.3306E 02  1.4648E-03
 50    .7170    90.0   557.32  5.1953E 00  1.2234E 00  1.6437E-03  6.6120E-03  1.3363E 02  1.2553E-03
 51    .7583    90.0   555.14  4.4639E 00  1.1624E 00  1.5578E-03  6.2670E-03  1.3311E 02  1.1898E-03
 52    .7996    90.0   556.03  4.7706E 00  1.2428E 00  1.6668E-03  6.7053E-03  1.3332E 02  1.2730E-03
 53    .8409    90.0   556.52  4.7627E 00  1.1932E 00  1.6013E-03  6.4418E-03  1.3344E 02  1.2230E-03
 54    .8822    90.0   557.49  4.7857E 00  1.1747E 00  1.5786E-03  6.3502E-03  1.3367E 02  1.2056E-03
 55    .9235    90.0   557.20  4.8520E 00  1.1670E 00  1.5676E-03  6.3060E-03  1.3360E 02  1.1972E-03
 56    .9648    90.0   555.93  4.8559E 00  1.1678E 00  1.5660E-03  6.2998E-03  1.3330E 02  1.1961E-03
 57    .2524   135.0   528.93  5.4422E-01  1.6008E-01  2.0828E-04  8.3881E-04  1.2687E 02  1.5925E-04
 58    .2943   135.0   533.11  2.2212E 00  7.1216E-01  9.2666E-04  3.7325E-03  1.2786E 02  7.0843E-04
 59    .3363   135.0   534.18  2.1942E 00  6.9255E-01  9.0240E-04  3.6345E-03  1.2812E 02  6.9064E-04
 60    .3783   135.0   533.66  2.3773E 00  7.3048E-01  9.6159E-04  3.8731E-03  1.2799E 02  7.3533E-04
 61    .4203   135.0   536.18  2.6928E 00  8.0945E-01  1.0574E-03  4.2583E-03  1.2857E 02  8.0847E-04
 62    .4623   135.0   537.81  3.1639E 00  9.1932E-01  1.2036E-03  4.8460E-03  1.2898E 02  9.2017E-04
 63    .5043   135.0   540.42  4.7051E 00  1.2022E 00  1.5793E-03  6.3588E-03  1.2960E 02  1.2073E-03
 64    .5463   135.0   542.45  5.5676E 00  1.4785E 00  1.9475E-03  7.8402E-03  1.3008E 02  1.4885E-03
 65    .5882   135.0   544.98  5.5708E 00  1.4809E 00  1.9572E-03  7.8783E-03  1.3069E 02  1.4958E-03
 66    .6302   135.0   546.56  5.6340E 00  1.4963E 00  1.9816E-03  7.9759E-03  1.3106E 02  1.5143E-03
 67    .6722   135.0   551.07  5.8542E 00  1.4078E 00  1.8756E-03  7.5473E-03  1.3213E 02  1.4324E-03
 68    .7170   135.0   552.31  5.2708E 00  [illegible] [illegible] 6.6794E-03  1.3248E 02  1.2670E-03
 69    .7583   135.0   548.12  3.9620E 00  9.4330E-01  1.2519E-03  5.0384E-03  1.3144E 02  9.5057E-04
 70    .7996   135.0   551.58  4.5576E 00  1.3243E 00  1.7656E-03  7.1043E-03  1.3226E 02  1.3480E-03
 71    .8409   135.0   552.06  4.0506E 00  1.2270E 00  1.6381E-03  6.5912E-03  1.3237E 02  1.2514E-03
 72    .8822   135.0   552.41  4.4536E 00  1.2049E 00  1.6082E-03  6.4708E-03  1.3246E 02  1.2279E-03
 73    .9235   135.0   553.21  4.7444E 00  1.1648E 00  1.5561E-03  6.2609E-03  1.3265E 02  1.1887E-03
 74    .9648   135.0   553.50  5.0070E 00  1.2041E 00  1.6095E-03  6.4758E-03  1.3272E 02  1.2294E-03
 75    .2524   180.0   530.86  2.4746E 00  7.1901E-01  9.3285E-04  3.7579E-03  1.2733E 02  7.1346E-04
 76    .2943   180.0   534.97  1.9760E 00  5.0550E-01  6.5931E-04  2.6544E-03  1.2829E 02  5.0416E-04
 77    .3363   180.0   536.55  2.1167E 00  6.2572E-01  8.1709E-04  3.2936E-03  1.2860E 02  6.2531E-04
 78    .3783   180.0   537.94  2.4463E 00  7.3536E-01  9.6291E-04  3.8775E-03  1.2901E 02  7.3616E-04
 79    .4203   180.0   540.57  2.9644E 00  8.7632E-01  1.1514E-03  4.6340E-03  1.2964E 02  8.8017E-04
 80    .4623   180.0   543.24  3.7997E 00  1.0851E 00  1.4308E-03  5.7508E-03  1.3027E 02  1.0939E-03
 81    .5043   180.0   545.42  4.7237E 00  1.1834E 00  1.5649E-03  6.2989E-03  1.3079E 02  1.1959E-03
 82    .5463   180.0   [illegible] [illegible] 1.4606E 00  1.9375E-03  7.7970E-03  1.3135E 02  1.4805E-03
 83    .5882   180.0   549.57  5.0575E 00  1.3430E 00  1.7858E-03  7.1863E-03  1.3178E 02  [illegible]
 84    .6302   180.0   539.47  5.9850E-02  1.5601E-02  2.0574E-05  8.2841E-05  1.2938E 02  1.5720E-05
 85    .6722   180.0   557.34  5.7914E 00  1.3927E 00  1.8715E-03  7.5275E-03  1.3364E 02  1.4291E-03
 86    .7170   180.0   559.31  5.5796E 00  1.3139E 00  1.7700E-03  7.1193E-03  1.3410E 02  1.3517E-03
 87    .7583   180.0   556.42  4.2294E 00  1.0171E 00  1.3648E-03  5.4904E-03  1.3341E 02  1.0420E-03
 88    .7996   180.0   559.64  4.6900E 00  1.2218E 00  1.6454E-03  6.6183E-03  1.3418E 02  1.2565E-03
 89    .8409   180.0   557.51  4.9263E 00  1.2587E 00  1.6961E-03  6.8270E-03  1.3415E 02  1.2952E-03
 90    .8822   180.0   559.46  5.7209E 00  1.2031E 00  1.6211E-03  6.5201E-03  1.3416E 02  1.2379E-03
 91    .9235   180.0   559.56  5.1382E 00  1.2613E 00  1.6997E-03  6.8362E-03  1.3416E 02  1.2979E-03
 92    .9648   180.0   560.72  5.4127E 00  1.2473E 00  1.6835E-03  6.7760E-03  1.3444E 02  1.2854E-03
 93    .8822   225.0   562.30  4.5860E 00  1.1720E 00  1.5863E-03  6.3790E-03  1.3494E 02  1.2111E-03
 94    .9648   225.0   561.69  4.8057E 00  1.1749E 00  1.5878E-03  6.3857E-03  1.3467E 02  1.2124E-03
 95    .7170   270.0   563.31  5.4898E 00  1.2389E 00  1.7050E-03  6.8586E-03  1.3500E 02  1.3017E-03
 96    .7996   270.0   566.84  6.5951E 00  1.2200E 00  1.6603E-03  6.6753E-03  1.3590E 02  1.2673E-03
 97    .8822   270.0   566.08  6.5947E 00  1.1748E 00  1.5961E-03  6.4172E-03  1.3572E 02  1.2184E-03
 98    .9648   270.0   562.86  6.7770E 00  1.1490E 00  1.5551E-03  6.2530E-03  1.3494E 02  1.1873E-03
```

GE ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

SYM PHI X/L SYM PHI X/L

GROUP 52


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 52
MACH NO 8
RE NO 2.15 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L SYM PHI X/L
0 - 225 -
45 - 270 -
90 - 315 -
135 - - 0.86
180 - - 0.96
32.00
24.00
16.00
8.00
0.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
ST X 10**4

2

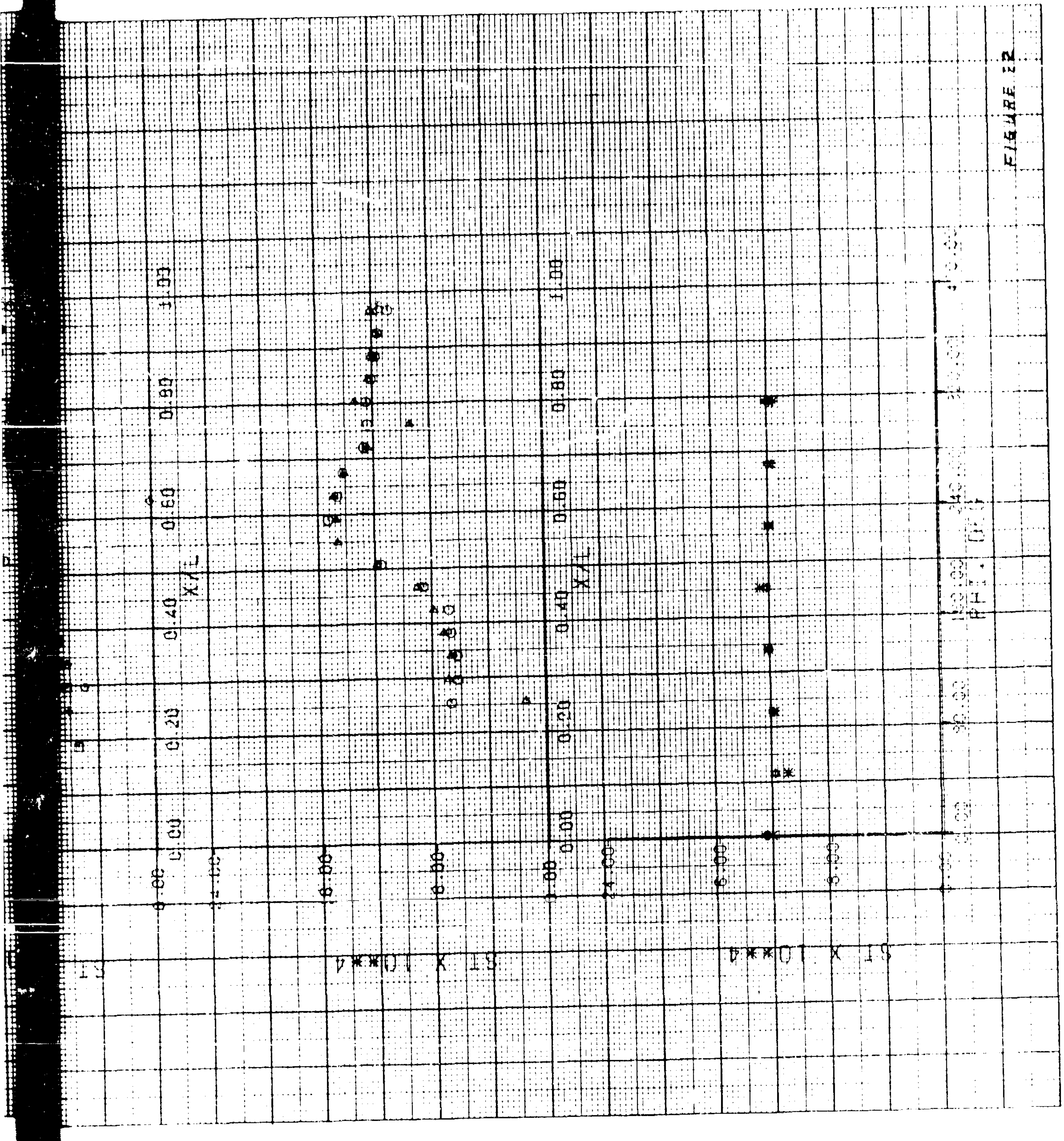
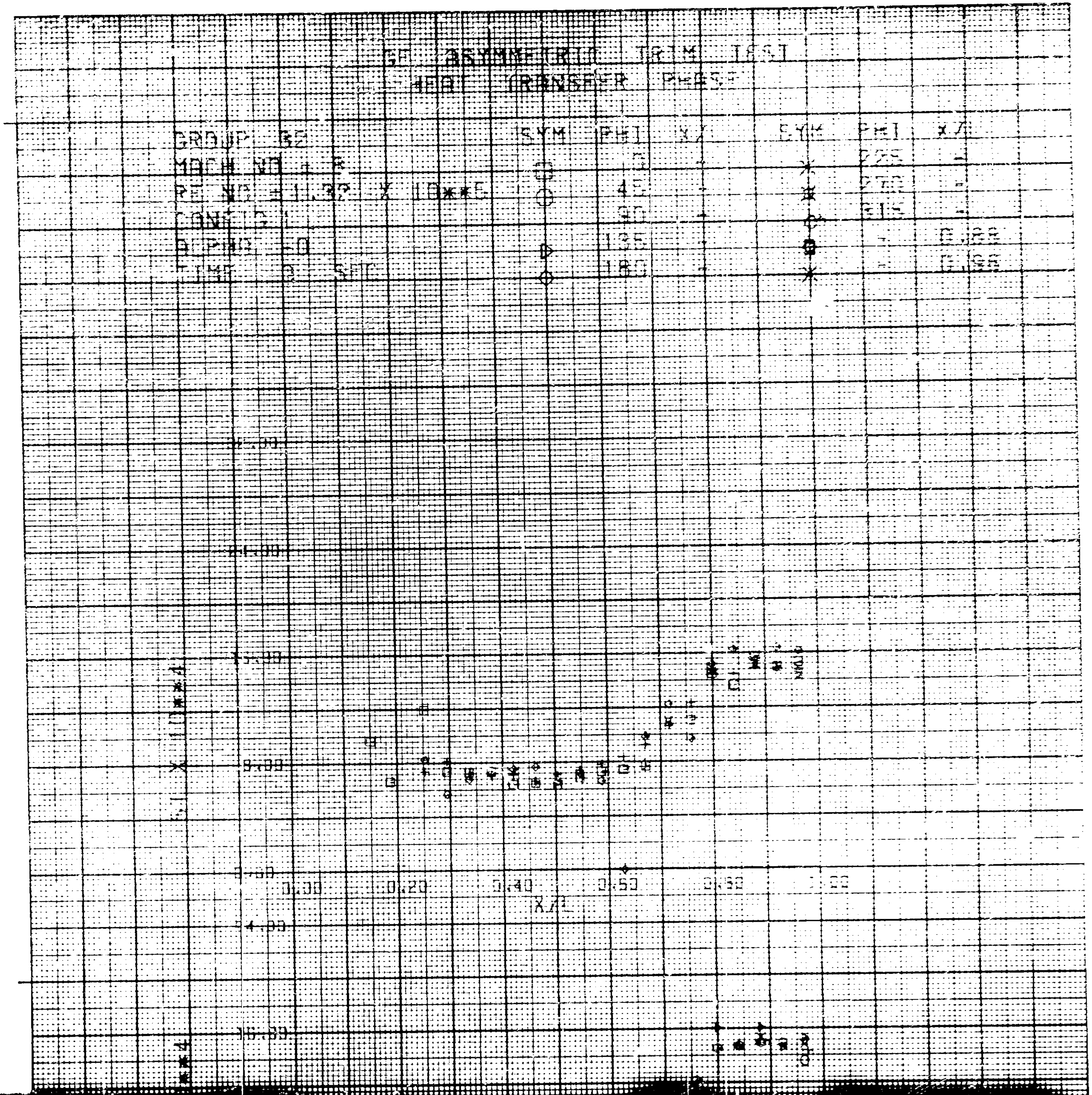


FIGURE 12
X/L
0.00
0.20
0.40
0.60
0.80
1.00
ST X 10**4
PHI, DEG
90.00
180.00
240.00
300.00

Figure 22

```
                                        7/14/69

                         AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                          VON KARMAN GAS DYNAMICS FACILITY
                             50 INCH HYPERSONIC TUNNEL B
                                     V10467 300
GROUP   CONFIG    ALPHA-M       BETA-M        ALPHA-S      ROLL   ALP-P   DATE     MACH NO        PO          TO          TIME
 38       1         -.03          0             -.03          0       0    715        7.97       280.78      1286.00       -.00
   T-INF        P-INF         Q-INF         V-INF         RHO-INF       MU-INF        RE/FT         RE/D          HO
 9.38400E 01  2.94701E-02  1.31030E 00  3.70310E 03  2.63405E-05  7.55509E-09  1.31917E 06  1.21029E 06  3.14422E 02

TC NO    X/L      PHI     TEMP      SLOPE        Q-STDM        HT           HH           HW          ST

    1   .1506      0     535.15  2.6518E 00  5.7647E-01  7.6029E-04  3.0969E-03  1.2835E 02  9.6564E-04
    2   .1867      0     535.07  1.8030E 00  3.9595E-01  5.2720E-04  2.1254E-03  1.2833E 02  6.6273E-04
    3   .2524      0     534.67  2.4131E 00  7.1333E-01  9.4936E-04  3.8269E-03  1.2822E 02  1.1933E-03
    4   .2943      0     533.94  1.8896E 00  4.1054E-01  5.8312E-04  2.3506E-03  1.2806E 02  7.3295E-04
    5   .3363      0     533.65  1.9757E 00  4.3423E-01  5.7716E-04  2.3267E-03  1.2799E 02  7.2540E-04
    6   .3783      0     533.09  1.9534E 00  4.3609E-01  5.8008E-04  2.3416E-03  1.2805E 02  7.3014E-04
    7   .4203      0     533.61  1.7038E 00  3.7802E-01  5.0349E-04  2.0297E-03  1.2798E 02  6.3287E-04
    8   .4623      0     534.49  1.7018E 00  3.8621E-01  5.1394E-04  2.0717E-03  1.2819E 02  6.4597E-04
    9   .5043      0     534.84  1.6910E 00  3.7633E-01  5.0100E-04  2.0195E-03  1.2827E 02  6.2970E-04
   10   .5463      0     536.73  1.8473E 00  4.0610E-01  5.4199E-04  2.1845E-03  1.2872E 02  6.8115E-04
   11   .5882      0     538.24  1.9700E 00  4.3259E-01  5.7852E-04  2.3315E-03  1.2908E 02  7.2700E-04
   12   .6302      0     540.17  1.9148E 00  4.3742E-01  5.8649E-04  2.3634E-03  1.2954E 02  7.3693E-04
   13   .6722      0     541.34  1.7962E 00  4.4998E-01  6.0427E-04  2.4349E-03  1.2982E 02  7.5923E-04
   99   .8822    315.0   553.05  3.3553E 00  8.7406E-01  1.1925E-03  4.8023E-03  1.3261E 02  1.4974E-03
   15   .7583      0     545.58  2.7022E 00  6.4981E-01  8.7765E-04  3.5357E-03  1.3083E 02  1.1025E-03
   16   .7996      0     547.19  3.0259E 00  8.4901E-01  1.1492E-03  4.6290E-03  1.3121E 02  1.4434E-03
   17   .8409      0     547.79  3.1310E 00  8.0000E-01  1.0837E-03  4.3652E-03  1.3136E 02  1.3611E-03
   18   .8822      0     548.70  3.6823E 00  9.2249E-01  1.2512E-03  5.0395E-03  1.3157E 02  1.5714E-03
   19   .9235      0     548.59  3.5099E 00  8.7924E-01  1.1924E-03  4.8027E-03  1.3154E 02  1.4975E-03
   20   .9648      0     547.20  3.7372E 00  8.9871E-01  1.2165E-03  4.9002E-03  1.3122E 02  1.5279E-03
   21   .2524     45.0   533.06  1.5971E 00  4.7212E-01  6.2703E-04  2.5270E-03  1.2785E 02  7.8818E-04
   22   .2943     45.0   532.89  1.4403E 00  4.6179E-01  6.1318E-04  2.4720E-03  1.2781E 02  7.7078E-04
   23   .3363     45.0   533.03  1.4611E 00  4.3921E-01  5.8331E-04  2.3515E-03  1.2784E 02  7.3322E-04
   24   .3783     45.0   533.41  1.4422E 00  4.3352E-01  5.7604E-04  2.3222E-03  1.2793E 02  7.2408E-04
   25   .4203     45.0   534.53  1.2008E 00  3.4891E-01  4.6430E-04  1.8716E-03  1.2820E 02  5.8358E-04
   26   .4623     45.0   536.79  1.3801E 00  3.8722E-01  5.1681E-04  2.0830E-03  1.2873E 02  6.4951E-04
   27   .5043     45.0   537.63  1.4234E 00  3.7799E-01  5.0508E-04  2.0356E-03  1.2894E 02  6.3473E-04
  100   .9648    315.0   551.51  3.4491E 00  8.2943E-01  1.1293E-03  4.5479E-03  1.3224E 02  1.4181E-03
   29   .5882     45.0   540.46  1.5772E 00  4.3458E-01  5.8290E-04  2.3489E-03  1.2961E 02  7.3242E-04
   30   .6302     45.0   542.44  1.7355E 00  4.7061E-01  6.3291E-04  2.5502E-03  1.3008E 02  7.9517E-04
   31   .6722     45.0   544.74  2.1552E 00  5.2903E-01  7.1369E-04  2.8753E-03  1.3063E 02  8.9655E-04
   32   .7170     45.0   546.72  2.5517E 00  6.0089E-01  8.1281E-04  3.2743E-03  1.3110E 02  1.0210E-03
   33   .7583     45.0   548.05  2.5762E 00  7.0982E-01  9.6189E-04  3.8745E-03  1.3142E 02  1.2081E-03
   34   .7996     45.0   549.36  3.0281E 00  8.4964E-01  1.1534E-03  4.6456E-03  1.3173E 02  1.4485E-03
   35   .8409     45.0   550.72  3.1824E 00  8.6097E-01  1.1709E-03  4.7159E-03  1.3205E 02  1.4705E-03
   36   .8822     45.0   551.55  3.3225E 00  8.7390E-01  1.1899E-03  4.7919E-03  1.3225E 02  1.4942E-03
   37   .9235     45.0   551.08  3.4093E 00  8.7111E-01  1.1866E-03  4.7787E-03  1.3233E 02  1.4900E-03
   38   .9648     45.0   551.14  3.2944E 00  7.9224E-01  1.0781E-03  4.3419E-03  1.3216E 02  1.3538E-03
   39   .2524     90.0   536.56  1.4765E 00  4.3647E-01  5.8240E-04  2.3474E-03  1.2868E 02  7.3194E-04
   40   .2943     90.0   536.31  1.9080E 00  4.8349E-01  6.4494E-04  2.5995E-03  1.2863E 02  8.1055E-04
   41   .3363     90.0   535.99  1.5540E 00  4.2738E-01  5.6983E-04  2.2968E-03  1.2855E 02  7.1617E-04
   42   .3783     90.0   536.61  1.3257E 00  4.1842E-01  5.5835E-04  2.2505E-03  1.2869E 02  7.0172E-04
   43   .4203     90.0   537.38  1.4235E 00  4.2081E-01  5.6212E-04  2.2656E-03  1.2888E 02  7.0642E-04
   44   .4623     90.0   536.51  1.2643E 00  3.9274E-01  5.2401E-04  2.1120E-03  1.2867E 02  6.5856E-04
   45   .5043     90.0   538.12  1.5260E 00  4.2045E-01  5.6220E-04  2.2658E-03  1.2905E 02  7.0649E-04
   46   .5463     90.0   540.38  1.5253E 00  4.3557E-01  5.8417E-04  2.3541E-03  1.2959E 02  7.3402E-04
   47   .5882     90.0   541.22  1.6436E 00  4.6116E-01  6.1919E-04  2.4951E-03  1.2979E 02  7.7799E-04
   48   .6302     90.0   542.52  1.7907E 00  4.9329E-01  6.6348E-04  2.6733E-03  1.3010E 02  8.3358E-04
   49   .6722     90.0   544.57  2.1669E 00  5.4284E-01  7.3215E-04  2.9497E-03  1.3059E 02  9.1974E-04
   50   .7170     90.0   546.75  2.6531E 00  6.2479E-01  8.4516E-04  3.4046E-03  1.3111E 02  1.0616E-03
   51   .7583     90.0   546.28  2.7761E 00  7.2317E-01  9.7763E-04  3.9383E-03  1.3100E 02  1.2280E-03
   52   .7996     90.0   547.50  3.2503E 00  8.4671E-01  1.1465E-03  4.6184E-03  1.3129E 02  1.4401E-03
   53   .8409     90.0   547.98  3.3854E 00  8.4811E-01  1.1492E-03  4.6289E-03  1.3140E 02  1.4433E-03
   54   .8822     90.0   549.11  3.5571E 00  8.7317E-01  1.1849E-03  4.7727E-03  1.3167E 02  1.4882E-03
   55   .9235     90.0   548.31  3.6231E 00  8.7129E-01  1.1811E-03  4.7575E-03  1.3148E 02  1.4834E-03
   56   .9648     90.0   546.19  3.5940E 00  8.6420E-01  1.1683E-03  4.7062E-03  1.3098E 02  1.4675E-03
   57   .2524    135.0   531.69  2.9316E-01  8.6681E-02  1.1489E-04  4.6319E-04  1.2752E 02  1.4443E-04
   58   .2943    135.0   531.77  1.5414E 00  4.9419E-01  6.5523E-04  2.6416E-03  1.2754E 02  8.2369E-04
   59   .3363    135.0   530.59  1.5227E 00  4.8062E-01  6.3624E-04  2.5652E-03  1.2726E 02  7.9986E-04
   60   .3783    135.0   528.06  1.3561E 00  4.2127E-01  5.5580E-04  2.2412E-03  1.2666E 02  6.9884E-04
   61   .4203    135.0   530.33  1.4462E 00  4.3472E-01  5.7527E-04  2.3194E-03  1.2720E 02  7.2323E-04
   62   .4623    135.0   530.88  1.4119E 00  4.1025E-01  5.4329E-04  2.1904E-03  1.2733E 02  6.8300E-04
   63   .5043    135.0   531.67  1.5496E 00  3.9594E-01  5.2488E-04  2.1161E-03  1.2752E 02  6.5983E-04
   64   .5463    135.0   532.60  1.6348E 00  4.3411E-01  5.7620E-04  2.3229E-03  1.2774E 02  7.2431E-04
   65   .5882    135.0   534.28  1.7086E 00  4.5371E-01  6.0356E-04  2.4330E-03  1.2814E 02  7.5863E-04
   66   .6302    135.0   535.95  1.9354E 00  5.1395E-01  6.8522E-04  2.7619E-03  1.2854E 02  8.6119E-04
   67   .6722    135.0   539.72  2.4555E 00  5.9050E-01  7.9125E-04  3.1886E-03  1.2944E 02  9.9425E-04
   68   .7170    135.0   540.91  2.8575E 00  6.7292E-01  9.0313E-04  3.6393E-03  1.2972E 02  1.1348E-03
   69   .7583    135.0   539.31  2.0681E 00  5.8027E-01  7.7713E-04  3.1318E-03  1.2934E 02  9.7653E-04
   70   .7996    135.0   540.94  3.2658E 00  9.4892E-01  1.2736E-03  5.1322E-03  1.2973E 02  1.6003E-03
   71   .8409    135.0   541.48  3.1493E 00  8.6772E-01  1.1655E-03  4.6963E-03  1.2985E 02  1.4643E-03
   72   .8822    135.0   541.86  3.5035E 00  9.4784E-01  1.2737E-03  5.1324E-03  1.2994E 02  1.6003E-03
   73   .9235    135.0   542.21  3.5063E 00  8.6066E-01  1.1572E-03  4.6626E-03  1.3003E 02  1.4538E-03
   74   .9648    135.0   543.86  [illegible]  9.0359E-01  1.2148E-03  4.8945E-03  1.3042E 02  1.5262E-03
   75   .2524    180.0   532.56  1.7023E 00  4.9443E-01  6.5644E-04  2.6464E-03  1.2772E 02  [illegible]
   76   .2943    180.0   533.20  1.0542E 00  3.3799E-01  4.4798E-04  1.8100E-03  1.2788E 02  5.6437E-04
   77   .3363    180.0   533.17  1.3606E 00  4.0340E-01  5.3580E-04  2.1600E-03  1.2786E 02  6.7350E-04
   78   .3783    180.0   532.95  1.4206E 00  4.2945E-01  5.7028E-04  2.2990E-03  1.2782E 02  7.1685E-04
   79   .4203    180.0   533.63  1.5094E 00  4.4621E-01  5.9307E-04  2.3908E-03  1.2798E 02  7.4547E-04
   80   .4623    180.0   534.16  1.5913E 00  4.5444E-01  6.0443E-04  2.4365E-03  1.2811E 02  7.5973E-04
   81   .5043    180.0   535.29  1.5601E 00  3.9083E-01  5.2061E-04  2.0985E-03  1.2838E 02  6.5433E-04
   82   .5463    180.0   536.63  1.6133E 00  4.2842E-01  5.7171E-04  2.3043E-03  1.2870E 02  7.1851E-04
   83   .5882    180.0   538.28  1.4623E 00  3.8630E-01  5.1911E-04  2.0929E-03  1.2909E 02  6.5260E-04
   84   .6302    180.0   536.80 -1.2756E-02 -3.3873E-03 -4.5217E-06 -1.8223E-05  1.2874E 02 -5.6820E-06
   85   .6722    180.0   545.17  2.4027E 00  5.7781E-01  7.7994E-04  3.1421E-03  1.3073E 02  9.7975E-04
   86   .7170    180.0   546.66  3.0497E 00  7.1817E-01  9.7137E-04  3.9130E-03  1.3109E 02  1.2201E-03
   87   .7583    180.0   544.65  2.3652E 00  5.6879E-01  7.6724E-04  3.0910E-03  1.3061E 02  9.6382E-04
   88   .7996    180.0   545.94  3.4296E 00  8.9342E-01  1.2072E-03  4.8633E-03  1.3092E 02  1.5164E-03
   89   .8409    180.0   545.83  3.7495E 00  9.5803E-01  1.2943E-03  5.2143E-03  1.3089E 02  1.6259E-03
   90   .8822    180.0   546.19  3.9402E 00  9.0799E-01  1.2273E-03  4.9442E-03  1.3096E 02  1.5417E-03
   91   .9235    180.0   547.30  3.9229E 00  9.6296E-01  1.3036E-03  5.2511E-03  1.3124E 02  1.6374E-03
   92   .9648    180.0   548.02  4.1048E 00  9.4591E-01  1.2818E-03  5.1630E-03  1.3141E 02  1.6099E-03
   93   .8822    225.0   548.58  3.5248E 00  9.0062E-01  1.2213E-03  4.9194E-03  1.3155E 02  1.5339E-03
   94   .9648    225.0   548.75  3.6029E 00  8.6643E-01  1.1752E-03  4.7336E-03  1.3158E 02  1.4780E-03
   95   .7170    270.0   550.71  2.9522E 00  6.4303E-01  8.7453E-04  3.5221E-03  1.3205E 02  1.0982E-03
   96   .7996    270.0   554.06  3.2087E 00  8.4993E-01  1.1625E-03  4.6809E-03  1.3304E 02  1.4599E-03
   97   .6722    270.0   556.21  3.4410E 00  8.7940E-01  1.2650E-03  4.8517E-03  1.3336E 02  1.5128E-03
   98   .9648    270.0   552.15  3.4664E 00  8.3360E-01  1.1359E-03  4.5748E-03  1.3243E 02  1.4264E-03
```

/


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 32
MACH NO = 8
RE NO = 1.32 X 10**6
CONFIG 1
ALPHA = 0
TIME = 3 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96
20.00
16.00
12.00
8.00
4.00
0.00
4.00
16.00
X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

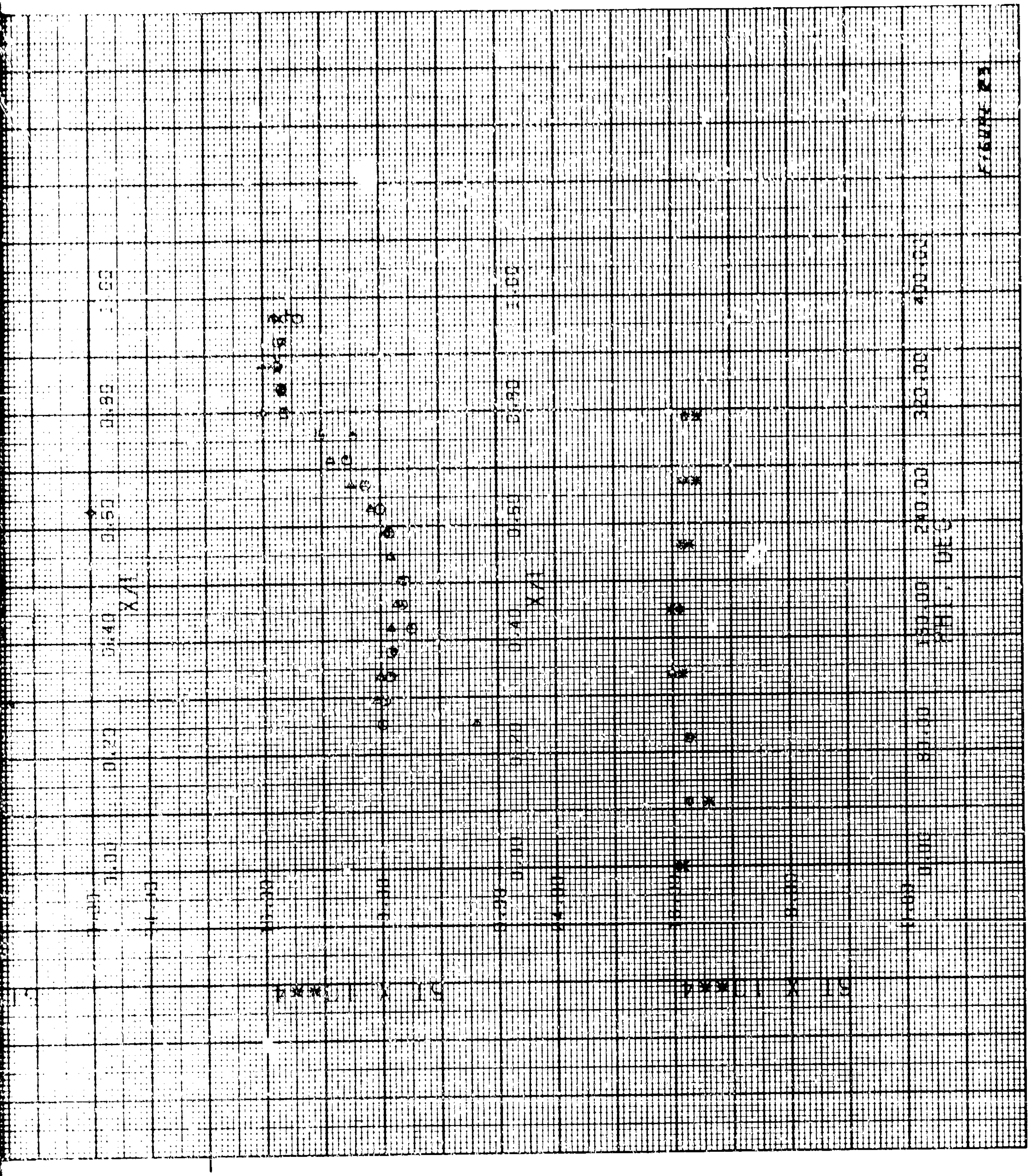
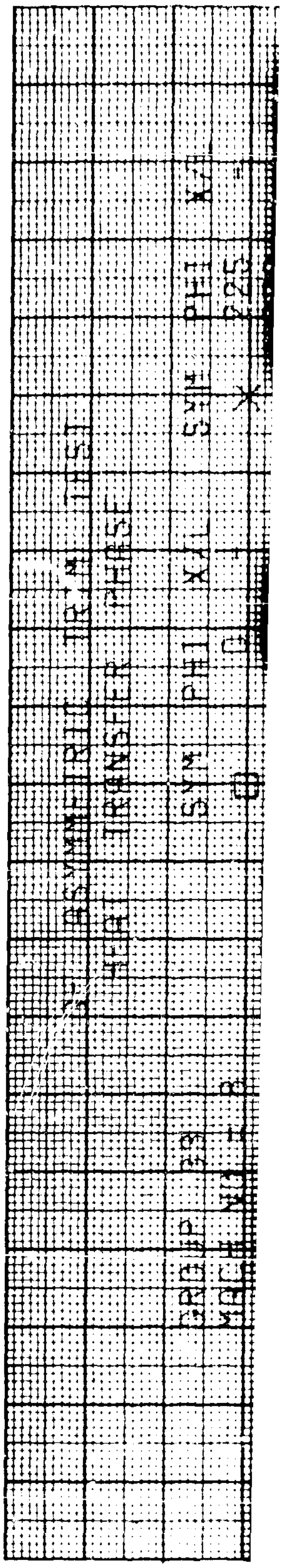


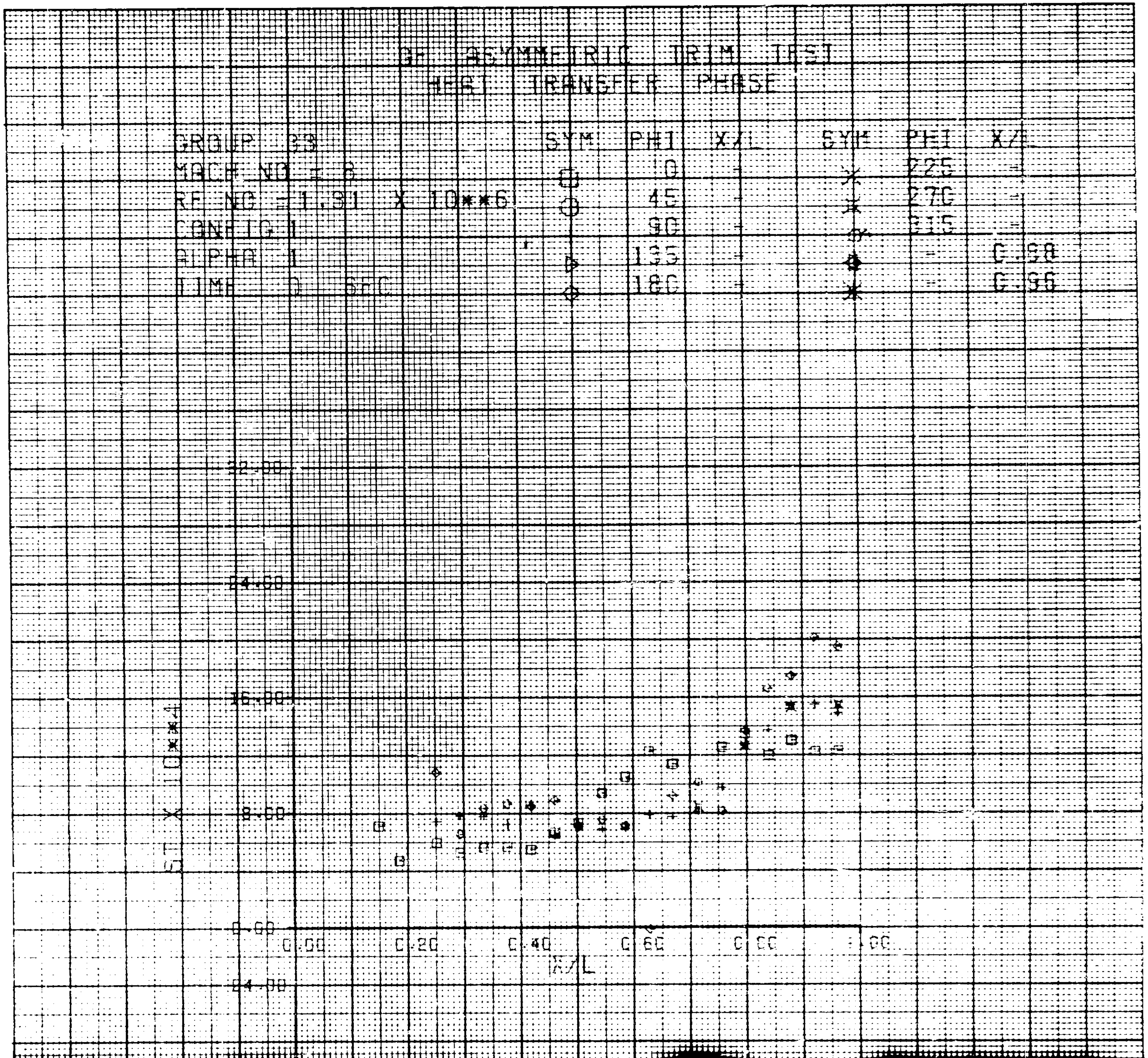
FIGURE 23
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
X/T
0.00
0.20
0.40
0.60
0.80
1.00
X/T
0.00
0.20
0.40
0.60
0.80
1.00
S1 X 10**4
S1 X 10**4

Figure 23

3

```
                                     7/14/69

                     AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                      VON KARMAN GAS DYNAMICS FACILITY
                        50 INCH HYPERSONIC TUNNEL B
                                VT0967-B00
GROUP    [illegible]   ALPHA-M     BETA-M        ALPHA-S     ROLL   ALP-P   DATE    MACH NO       PO          TO          TIME
 33          1            .99          0           .99         0       0     715      7.97        279.50     1284.00      -.00
  T-INF          P-INF         Q-INF        V-INF        RHO-INF      MU-INF        RE/FT        RE/D          HO
 9.18500E 01  2.93440E-02  1.30477E 00  3.78310E 03  2.02350E-05  7.55506E-08  1.31372E 06  1.20555E 06  3.14622E 02

TC NO   X/L     PHI    TEMP     SLOPE       Q-STOR       HT          HH          HW         ST

   1  .1[illegible]06    0    525.82  1.9420E 00  4.2215E-01  5.5532E-04  2.2396E-03  1.2613E 02  7.0132E-04
   2  .1867      0    526.75  1.2638E 00  2.7756E-01  3.6557E-04  1.4742E-03  1.2615E 02  4.6166E-04
   3  .2524      0    528.01  1.1952E 00  3.5332E-01  4.6614E-04  1.8797E-03  1.2665E 02  5.8862E-04
   4  .2943      0    510.20  9.8194E-01  3.1056E-01  4.1090E-04  1.6567E-03  1.2717E 02  5.1881E-04
   5  .3363      0    511.16  1.0480E 00  3.3095E-01  4.3844E-04  1.7677E-03  1.2740E 02  5.5355E-04
   6  .3783      0    511.89  1.1086E 00  3.3323E-01  4.4187E-04  1.7814E-03  1.2750E 02  5.5785E-04
   7  .4203      0    511.77  1.1051E 00  3.2111E-01  4.2575E-04  1.7164E-03  1.2754E 02  5.3759E-04
   8  .4623      0    512.06  1.4137E 00  3.8953E-01  5.1707E-04  2.0845E-03  1.2775E 02  6.5277E-04
   9  .5043      0    512.83  1.5868E 00  4.2924E-01  5.6997E-04  2.2978E-03  1.2780E 02  7.1954E-04
  10  .5463      0    514.31  1.9745E 00  5.5400E-01  7.3780E-04  2.9709E-03  1.2815E 02  9.3034E-04
  11  .5882      0    515.70  2.2518E 00  6.2043E-01  8.2647E-04  3.3314E-03  1.2838E 02  1.0433E-03
  12  .6302      0    517.23  2.6769E 00  7.2421E-01  9.6719E-04  3.8982E-03  1.2884E 02  1.2207E-03
  13  .6722      0    540.31  2.6605E 00  6.6651E-01  9.9384E-04  3.6019E-03  1.2958E 02  1.1279E-03
  14  .7170  315.0    547.72  3.0217E 00  7.8714E-01  1.0662E-03  4.2947E-03  1.3134E 02  1.3449E-03
  15  .7583      0    541.97  3.0650E 00  7.3707E-01  9.9064E-04  3.9917E-03  1.2997E 02  1.2500E-03
  16  .7996      0    543.11  2.8111E 00  7.8875E-01  1.0617E-03  4.2778E-03  1.3024E 02  1.3396E-03
  17  .8409      0    543.72  2.7385E 00  6.9972E-01  9.4267E-04  3.7980E-03  1.3039E 02  1.1893E-03
  18  .8822      0    544.61  3.0374E 00  7.6093E-01  1.0264E-03  4.1350E-03  1.3060E 02  1.2949E-03
  19  .9235      0    544.80  2.8523E 00  7.1455E-01  9.6405E-04  3.8839E-03  1.3065E 02  1.2162E-03
  20  .9648      0    545.61  2.9767E 00  7.1584E-01  9.6604E-04  3.8950E-03  1.3084E 02  1.2197E-03
  21  .2524   45.0    526.32  1.4791E 00  4.3722E-01  5.7553E-04  2.3210E-03  1.2625E 02  7.2683E-04
  22  .2943   45.0    528.44  1.2103E 00  3.9060E-01  5.1560E-04  2.0791E-03  1.2675E 02  6.5106E-04
  23  .3363   45.0    529.66  1.2953E 00  3.8934E-01  5.1482E-04  2.0758E-03  1.2704E 02  6.5003E-04
  24  .3783   45.0    531.30  1.0985E 00  3.3020E-01  4.3753E-04  1.7640E-03  1.2743E 02  5.5239E-04
  25  .4203   45.0    531.83  1.1179E 00  3.2682E-01  4.3069E-04  1.7360E-03  1.2756E 02  5.4375E-04
  26  .4623   45.0    534.31  1.2836E 00  3.6011E-01  4.7907E-04  1.9311E-03  1.2815E 02  6.0474E-04
  27  .5043   45.0    535.46  1.3731E 00  3.6462E-01  4.8580E-04  1.9582E-03  1.2842E 02  6.1320E-04
 1[illegible]  .[illegible]648  115.0    550.69  3.1537E 00  7.5839E-01  1.0314E-03  4.1539E-03  1.3205E 02  1.3008E-03
  29  .5882   45.0    536.97  1.6165E 00  4.4538E-01  5.9461E-04  2.3966E-03  1.2878E 02  7.5049E-04
  30  .6302   45.0    538.87  1.8625E 00  5.0388E-01  6.7442E-04  2.7180E-03  1.2923E 02  8.5113E-04
  31  .6722   45.0    543.21  2.3338E 00  5.7288E-01  7.7126E-04  3.1075E-03  1.3027E 02  9.7311E-04
  32  .7170   45.0    544.99  2.7851E 00  6.5586E-01  8.8509E-04  3.5658E-03  1.3069E 02  1.1166E-03
  33  .7583   45.0    544.00  2.7382E 00  7.5446E-01  1.0160E-03  4.0766E-03  1.3045E 02  1.2829E-03
  34  .7996   45.0    544.89  2.9444E 00  8.2615E-01  1.1147E-03  4.4910E-03  1.3067E 02  1.4064E-03
  35  .8409   45.0    546.36  3.0862E 00  8.3695E-01  1.1289E-03  4.5475E-03  1.3102E 02  1.4240E-03
  36  .8822   45.0    547.19  3.1170E 00  8.1886E-01  1.1097E-03  4.4701E-03  1.3121E 02  1.3998E-03
  37  .9235   45.0    547.44  3.0720E 00  7.8512E-01  1.0630E-03  4.2821E-03  1.3127E 02  1.3409E-03
  38  .9648   45.0    549.06  2.8582E 00  6.8734E-01  9.3266E-04  3.7566E-03  1.3165E 02  1.1764E-03
  39  .2524   90.0    530.16  1.4847E 00  4.3880E-01  5.8065E-04  2.3412E-03  1.2716E 02  7.3314E-04
  40  .2943   90.0    531.67  1.4449E 00  4.6376E-01  6.1413E-04  2.4760E-03  1.2752E 02  7.7535E-04
  41  .3363   90.0    532.48  1.4604E 00  4.6096E-01  6.1174E-04  2.4662E-03  1.2771E 02  7.7229E-04
  42  .3783   90.0    533.20  1.3505E 00  4.2627E-01  5.6625E-04  2.2827E-03  1.2788E 02  7.1483E-04
  43  .4203   90.0    534.28  1.7085E 00  5.0506E-01  6.7186E-04  2.7083E-03  1.2814E 02  8.4811E-04
  44  .4623   90.0    534.22  1.2289E 00  3.8174E-01  5.0778E-04  2.0469E-03  1.2812E 02  6.4098E-04
  45  .5043   90.0    535.61  1.5411E 00  4.2462E-01  5.6588E-04  2.2809E-03  1.2846E 02  7.1428E-04
  46  .5463   90.0    535.6-  1.4089E 00  4.0233E-01  5.3621E-04  2.1613E-03  1.2847E 02  6.7682E-04
  47  .5882   90.0    537.87  1.4406E 00  4.0420E-01  5.4028E-04  2.1775E-03  1.2899E 02  6.8187E-04
  48  .6302   90.0    539.11  1.4781E 00  4.6237E-01  6.1906E-04  2.4948E-03  1.2929E 02  7.8125E-04
  49  .6722   90.0    541.88  1.8002E 00  4.5100E-01  6.0608E-04  2.4421E-03  1.2995E 02  7.6475E-04
  50  .7170   90.0    544.40  2.0032E 00  4.7173E-01  6.3609E-04  2.5627E-03  1.3055E 02  8.0252E-04
  51  .7583   90.0    541.60  2.1857E 00  5.6937E-01  7.6487E-04  3.0820E-03  1.2988E 02  9.6513E-04
  52  .7996   90.0    542.68  2.8626E 00  7.4571E-01  1.0032E-03  4.0421E-03  1.3014E 02  1.2658E-03
  53  .8409   90.0    543.04  3.2110E 00  8.0443E-01  1.0828E-03  4.3626E-03  1.3023E 02  1.3661E-03
  54  .8822   90.0    544.33  3.6775E 00  9.0271E-01  1.2171E-03  4.9036E-03  1.3053E 02  1.5356E-03
  55  .9235   90.0    544.20  3.7725E 00  9.0721E-01  1.2230E-03  4.9272E-03  1. 350E 02  1.5430E-03
  56  .9648   90.0    544.89  3.6267E 00  8.7214E-01  1.1768E-03  4.7411E-03  1.3067E 02  1.4847E-03
  57  .2524  135.0    524.97  3.6452E-01  1.0776E-01  1.4159E-04  5.7106E-04  1.2593E 02  1.7883E-04
  58  .2943  135.0    526.51  1.7636E 00  5.6546E-01  7.4453E-04  3.0025E-03  1.2629E 02  9.4023E-04
  59  .3363  135.0    526.88  1.7003E 00  5.3667E-01  7.0696E-04  2.8509E-03  1.2638E 02  8.9277E-04
  60  .3783  135.0    525.05  1.6288E 00  5.0596E-01  6.6490E-04  2.6816E-03  1.2595E 02  8.3974E-04
  61  .4203  135.0    527.96  1.5895E 00  4.7779E-01  6.3030E-04  2.5416E-03  1.2664E 02  7.9591E-04
  62  .4623  135.0    528.90  1.5302E 00  4.4462E-01  5.8727E-04  2.3680E-03  1.2686E 02  7.4154E-04
  63  .5043  135.0    529.99  1.7167E 00  4.3862E-01  5.8018E-04  2.3393E-03  1.2712E 02  7.3255E-04
  64  .5463  135.0    530.71  1.6414E 00  4.3587E-01  5.7708E-04  2.3267E-03  1.2729E 02  7.2861E-04
  65  .5882  135.0    531.74  1.7042E 00  4.5256E-01  6.0001E-04  2.4190E-03  1.2754E 02  7.5751E-04
  66  .6302  135.0    533.09  1.9749E 00  4.9787E-01  6.6126E-04  2.6658E-03  1.2786E 02  8.3478E-04
  67  .6722  135.0    537.72  2.1697E 00  5.2178E-01  6.9730E-04  2.8103E-03  1.2896E 02  8.8006E-04
  68  .7170  135.0    539.22  2.2350E 00  5.2632E-01  7.0470E-04  2.8403E-03  1.2932E 02  8.8943E-04
  69  .7583  135.0    536.05  1.5919E 00  4.4604E-01  5.9557E-04  2.4005E-03  1.2854E 02  7.5173E-04
  70  .7996  135.0    538.46  2.8837E 00  8.3789E-01  1.1209E-03  4.5172E-03  1.2914E 02  1.4146E-03
  71  .8409  135.0    540.14  3.2120E 00  8.8499E-01  1.1865E-03  4.7814E-03  1.2953E 02  1.4973E-03
  72  .8822  135.0    540.72  3.8089E 00  1.0305E 00  1.3826E-03  5.5716E-03  1.2967E 02  1.7447E-03
  73  .9235  135.0    542.13  4.0580E 00  9.9612E-01  1.3391E-03  5.3957E-03  1.3001E 02  1.6897E-03
  74  .9648  135.     543.23  4.3179E 00  1.0384E 00  1.3980E-03  5.6326E-03  1.3027E 02  1.7638E-03
  75  .2524  180.0    527.48  2.2292E 00  6.4771E-01  8.5392E-04  3.4435E-03  1.2652E 02  1.0783E-03
  76  .2943  180.0    529.49  1.2150E 00  3.8956E-01  5.1494E-04  2.0763E-03  1.2700E 02  6.5019E-04
  77  .3363  180.0    530.08  1.6816E 00  4.9711E-01  6.5761E-04  2.6515E-03  1.2714E 02  8.3031E-04
  78  .3783  180.0    530.80  1.7018E 00  5.1156E-01  6.7738E-04  2.7311E-03  1.2731E 02  8.5524E-04
  79  .4203  180.0    532.45  1.4954E 00  5.0118E-01  6.6510E-04  2.6813E-03  1.2770E 02  8.3965E-04
  80  .4623  180.0    533.73  1.8346E 00  5.2390E-01  6.9642E-04  2.8074E-03  1.2801E 02  8.7914E-04
  81  .5043  180.0    534.83  1.6511E 00  4.1363E-01  5.5065E-04  2.2190E-03  1.2827E 02  6.9508E-04
  82  .5463  180.0    535.68  1.6653E 00  4.4222E-01  5.8930E-04  2.3750E-03  1.2847E 02  7.4393E-04
  83  .5882  180.0    536.79  1.5633E 00  4.1514E-01  5.5411E-04  2.2333E-03  1.2874E 02  6.9937E-04
  84  .6302  180.0    537.42 -3.9415E-02 -1.0467E-02 -1.3982E-05 -5.6353E-05  1.2889E 02 -1.7647E-05
  85  .6722  180.0    543.84  2.2209E 00  5.3409E-01  7.1964E-04  2.8994E-03  1.3042E 02  9.0795E-04
  86  .7170  180.0    545.23  2.5064E 00  5.9023E-01  7.9678E-04  3.2100E-03  1.3075E 02  1.0032E-03
  87  .7583  180.0    543.36  1.9732E 00  4.7651E-01  6.3894E-04  2.5744E-03  1.3039E 02  8.0416E-04
  88  .7996  180.0    545.00  3.0667E 00  7.9888E-01  1.0741E-03  4.3434E-03  1.3069E 02  1.3601E-03
  89  .8409  180.0    546.32  3.7957E 00  9.6985E-01  1.3112E-03  5.2819E-03  1.3101E 02  1.6540E-03
  90  .8822  180.0    547.27  4.4210E 00  1.0188E 00  1.3791E-03  5.5552E-03  1.3123E 02  1.7396E-03
  91  .9235  180.0    547.77  4.7762E 00  1.1724E 00  1.5881E-03  6.3972E-03  1.3135E 02  2.0033E-03
  92  .9648  180.0    549.52  4.9273E 00  1.1354E 00  1.5417E-03  6.2096E-03  1.3177E 02  1.9445E-03
  93  .8822  225.0    549.28  3.7907E 00  9.6857E-01  1.3147E-03  5.2954E-03  1.3171E 02  1.6582E-03
  94  .9648  225.0    550.05  4.2198E 00  1.0148E 00  1.3789E-03  5.5535E-03  1.3190E 02  1.7391E-03
  95  .7170  270.0    549.86  2.1730E 00  4.8990E-01  6.6478E-04  2.6776E-03  1.3166E 02  8.3849E-04
  96  .7996  270.0    551.49  2.7532E 00  7.3113E-01  9.9539E-04  4.0087E-03  1.3224E 02  1.2553E-03
  97  .8822  270.0    552.43  3.4762E 00  8.8821E-01  1.2108E-03  4.8760E-03  1.324 E 02  1.5269E-03
  98  .9648  270.0    551.04  3.7281E 00  8.9653E-01  1.22 2E-03  4.9179E-03  1.3232E 02  1.5400E-03
```




GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 33
MACH NO = 8
RE NO = 1.31 X 10**6
CONFIG 1
ALPHA 1
TIME 0 SEC
SYM PHI X/L SYM PHI X/L
□ 0 = ✕ 225 =
○ 45 = ⌶ 270 =
90 = ✧ 315 =
▷ 135 = ◆ = 0.98
◇ 180 = ✱ = 0.96
32.00
24.00
16.00
8.00
0.00
-8.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

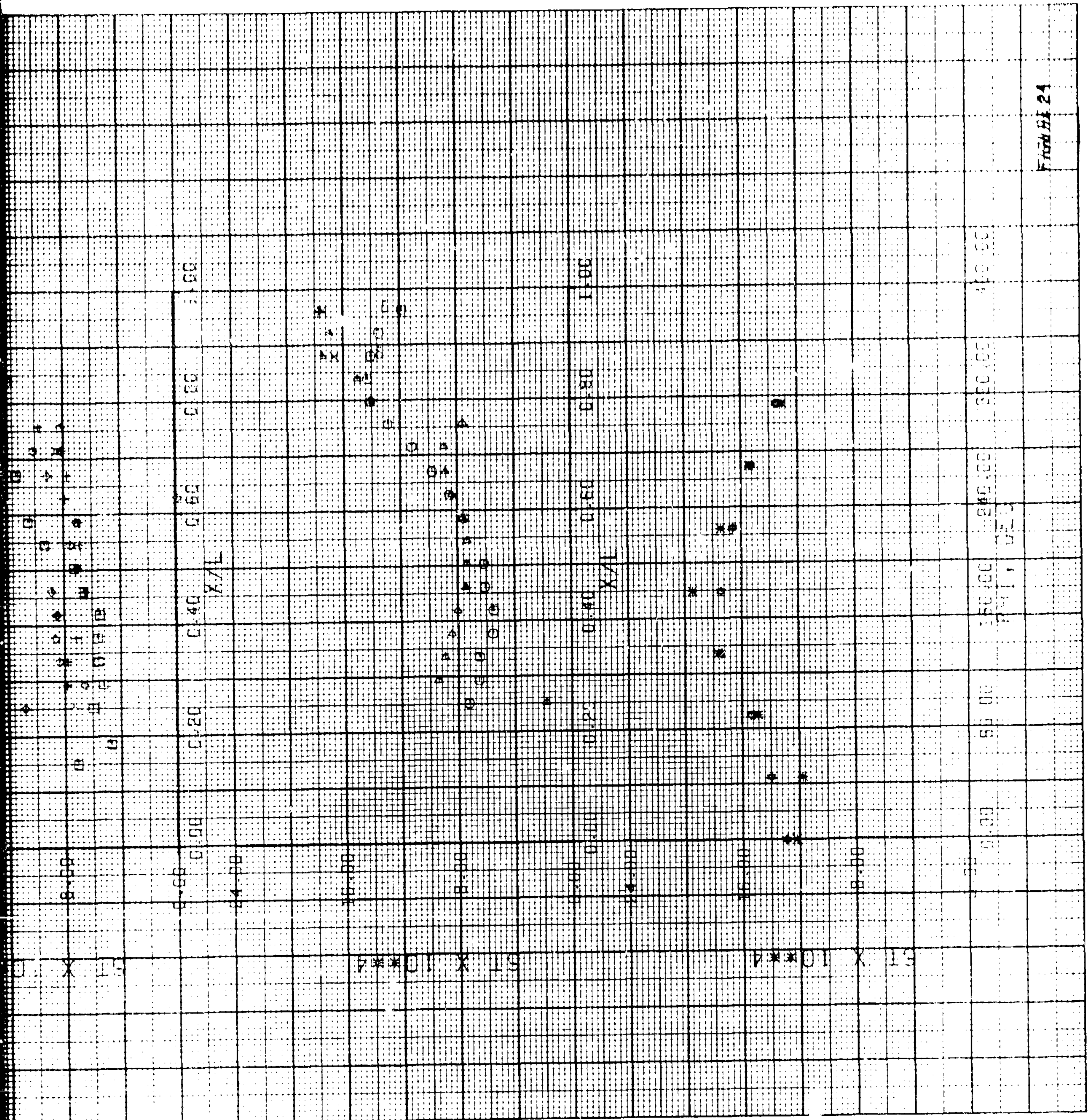


Figure 24
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
50.00
150.00
200.00
300.00
400.00
8.00
4.00
16.00
8.00
10**4
10**4

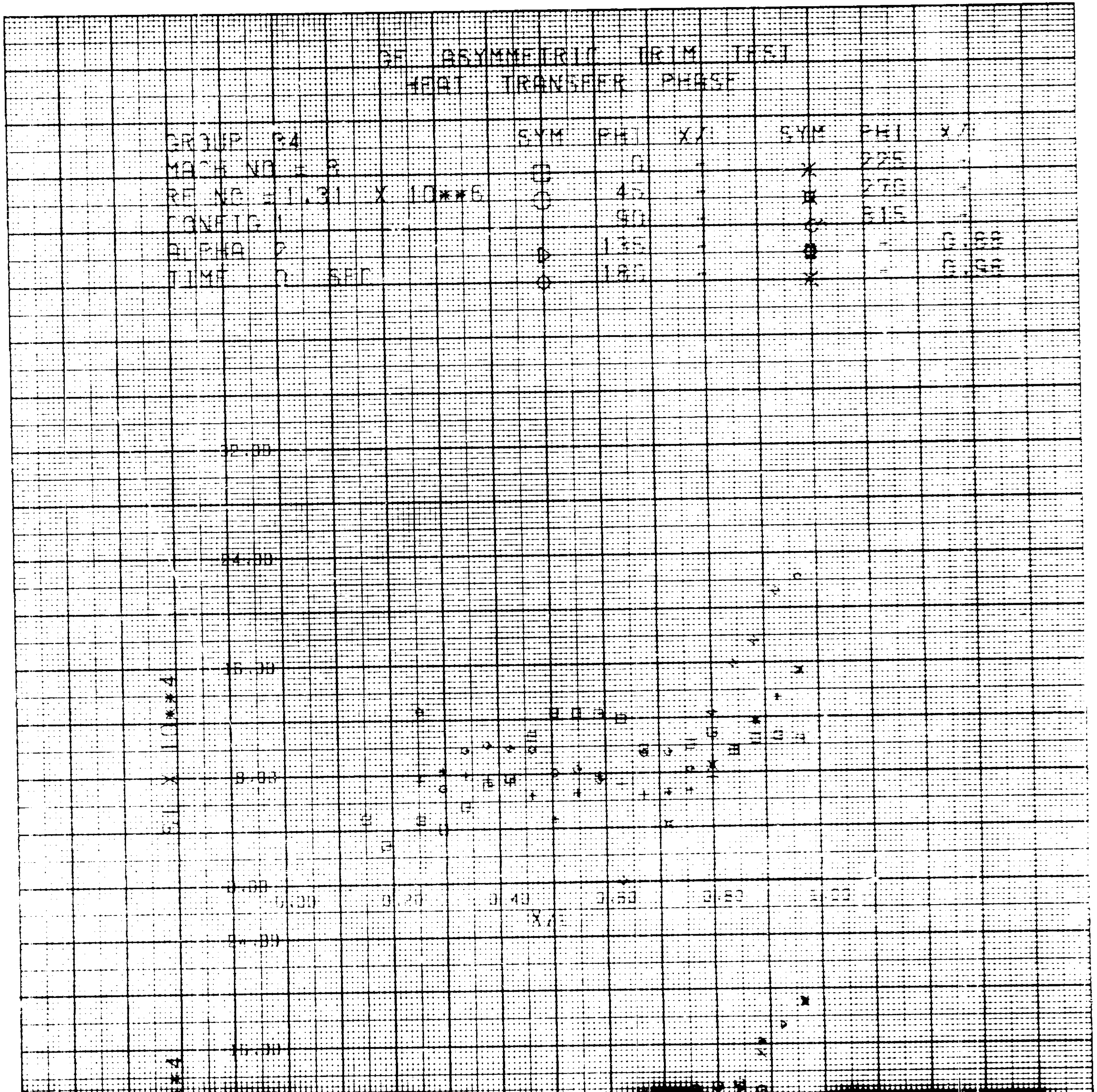
Figure 24

```
                                        7/14/69

                         AEDC-ARO, INC., ARNOLD AFS, TENNESSEE
                          VON KARMAN GAS DYNAMICS FACILITY
                            50 INCH HYPERSONIC TUNNEL B
                                   VT0967-B00
GROUP   CONFIG     ALPHA-M       BETA-M        ALPHA-S      ROLL    ALP-P   DATE       MACH NO        PO          TO          TIME
 34        1         2.00            0           2.00          0        0    715         7.97        279.20     1806.00        -.00
   T-INF         P-INF        Q-INF         V-INF       RHO-INF        MU-INF          RE/FT          RE/D          MO
 9.38400E 01  2.93125E-02  1.30337E 00  3.78310E 03  2.62070E-05  7.55506E-08  1.31231E 06  1.20425E 06  3.14022E 02

TC NO    X/L       PHI     TEMP      SLOPE        Q-STOR         HT           HM          HW          ST

   1   .1506        0     525.20  1.3131E 00  2.0544E-01  3.7518E-04  1.5131E-03  1.2598E 02  4.7434E-04
   2   .1867        0     525.18  7.6635E-01  1.6930E-01  2.2121E-04  8.9216E-04  1.2598E 02  2.7968E-04
   3   .2524        0     526.26  9.3366E-01  2.7600E-01  3.6328E-04  1.4650E-03  1.2623E 02  4.5927E-04
   4   .2943        0     529.54  7.5480E-01  2.3026E-01  3.1497E-04  1.2700E-03  1.2701E 02  3.9812E-04
   5   .3363        0     530.76  1.0593E 00  3.3433E-01  4.4268E-04  1.7848E-03  1.2730E 02  5.5952E-04
   6   .3783        0     531.89  1.4109E 00  4.2412E-01  5.6241E-04  2.2679E-03  1.2757E 02  7.1080E-04
   7   .4203        0     532.23  1.5757E 00  4.5784E-01  6.0741E-04  2.4488E-03  1.2765E 02  7.6766E-04
   8   .4623        0     533.60  2.3204E 00  6.3933E-01  8.4972E-04  3.4254E-03  1.2798E 02  1.0738E-03
   9   .5043        0     534.09  2.7345E 00  7.3979E-01  9.8389E-04  3.9662E-03  1.2818E 02  1.2433E-03
  10   .5463        0     535.89  2.6235E 00  7.3611E-01  9.8133E-04  3.9555E-03  1.2852E 02  1.2400E-03
  11   .5882        0     537.00  2.6496E 00  7.3005E-01  9.7471E-04  3.9285E-03  1.2879E 02  1.2315E-03
  12   .6302        0     538.58  2.6089E 00  7.0580E-01  9.4431E-04  3.8057E-03  1.2916E 02  1.1930E-03
  13   .6722        0     540.09  2.2941E 00  5.7473E-01  7.7133E-04  3.1082E-03  1.2971E 02  9.7437E-04
  99   .8822    315.0     548.06  2.7308E 00  7.1136E-01  9.6398E-04  3.8829E-03  1.3142E 02  1.2172E-03
  15   .7583        0     542.76  2.4489E 00  5.8891E-01  7.9235E-04  3.1925E-03  1.3018E 02  1.0008E-03
  16   .7996        0     543.78  2.2753E 00  6.3840E-01  8.6012E-04  3.4654E-03  1.3040E 02  1.0864E-03
  17   .8409        0     544.07  2.1910E 00  5.6002E-01  7.5481E-04  3.0411E-03  1.3047E 02  9.5334E-04
  18   .8822        0     544.53  2.4336E 00  6.0969E-01  8.2225E-04  3.3127E-03  1.3058E 02  1.0385E-03
  19   .9235        0     544.29  2.4709E 00  6.2101E-01  8.3726E-04  3.3732E-03  1.3052E 02  1.0575E-03
  20   .9648        0     545.14  2.5113E 00  6.0392E-01  8.1516E-04  3.2840E-03  1.3073E 02  1.0295E-03
  21   .2524     45.0     524.75  1.3614E 00  4.0244E-01  5.2865E-04  2.1321E-03  1.2587E 02  6.6840E-04
  22   .2943     45.0     527.65  1.2352E 00  3.9602E-01  5.2222E-04  2.1058E-03  1.2656E 02  6.6016E-04
  23   .3363     45.0     529.00  1.2236E 00  3.6781E-01  4.8588E-04  1.9592E-03  1.2688E 02  6.1418E-04
  24   .3783     45.0     530.88  1.1186E 00  3.3624E-01  4.4529E-04  1.7953E-03  1.2733E 02  5.6280E-04
  25   .4203     45.0     531.62  1.0261E 00  2.9815E-01  3.9522E-04  1.5934E-03  1.2751E 02  4.9951E-04
  26   .4623     45.0     534.25  1.2289E 00  3.4480E-01  4.5867E-04  1.8489E-03  1.2813E 02  5.7961E-04
  27   .5043     45.0     535.68  1.4287E 00  3.7939E-01  5.0551E-04  2.0376E-03  1.2843E 02  6.3876E-04
 100   .9648    315.0     550.73  2.8211E 00  6.7843E-01  9.2269E-04  3.7161E-03  1.3206E 02  1.1650E-03
  29   .5882     45.0     537.53  1.8628E 00  5.1325E-01  6.8574E-04  2.7638E-03  1.2891E 02  8.6640E-04
  30   .6302     45.0     539.46  2.2219E 00  6.0113E-01  8.0521E-04  3.2449E-03  1.2937E 02  1.0172E-03
  31   .6722     45.0     543.57  2.7908E 00  6.8505E-01  9.2271E-04  3.7176E-03  1.3035E 02  1.1654E-03
  32   .7170     45.0     545.17  2.9267E 00  6.8921E-01  9.3032E-04  3.7479E-03  1.3073E 02  1.1749E-03
  33   .7583     45.0     544.33  2.6996E 00  7.4382E-01  1.0029E-03  4.0405E-03  1.3053E 02  1.2667E-03
  34   .7996     45.0     545.18  2.6947E 00  7.5608E-01  1.0206E-03  4.1117E-03  1.3074E 02  1.2890E-03
  35   .8409     45.0     546.43  2.8370E 00  7.6753E-01  1.0378E-03  4.1807E-03  1.3103E 02  1.3106E-03
  36   .8822     45.0     547.04  2.9003E 00  7.3655E-01  9.9674E-04  4.0151E-03  1.3118E 02  1.2587E-03
  37   .9235     45.0     547.09  2.6988E 00  6.8956E-01  9.3322E-04  3.7592E-03  1.3119E 02  1.1785E-03
  38   .9648     45.0     548.72  2.5708E 00  6.1823E-01  8.3853E-04  3.3775E-03  1.3158E 02  1.0588E-03
  39   .2524     90.0     528.71  1.5291E 00  4.5203E-01  5.9690E-04  2.4069E-03  1.2682E 02  7.5453E-04
  40   .2943     90.0     530.87  1.5364E 00  4.9261E-01  6.5236E-04  2.6302E-03  1.2733E 02  8.2453E-04
  41   .3363     90.0     531.70  1.4972E 00  4.7257E-01  6.2650E-04  2.5258E-03  1.2753E 02  7.9180E-04
  42   .3783     90.0     532.57  1.4406E 00  4.5471E-01  6.0351E-04  2.4330E-03  1.2773E 02  7.6272E-04
  43   .4203     90.0     533.44  1.4805E 00  4.3764E-01  5.8155E-04  2.3444E-03  1.2795E 02  7.3493E-04
  44   .4623     90.0     533.55  1.2177E 00  3.7827E-01  5.0272E-04  2.0266E-03  1.2797E 02  6.3531E-04
  45   .5043     90.0     535.35  9.9593E-01  2.7441E-01  3.6556E-04  1.4735E-03  1.2840E 02  4.6193E-04
  46   .5463     90.0     535.42  1.3603E 00  3.8846E-01  5.1755E-04  2.0862E-03  1.2841E 02  6.5398E-04
  47   .5882     90.0     537.62  1.6389E 00  4.5983E-01  6.1443E-04  2.4764E-03  1.2893E 02  7.7630E-04
  48   .6302     90.0     538.81  1.5336E 00  4.2255E-01  5.6551E-04  2.2791E-03  1.2922E 02  7.1445E-04
  49   .6722     90.0     541.62  1.4906E 00  3.7343E-01  5.0166E-04  2.0214E-03  1.2989E 02  6.3369E-04
  50   .7170     90.0     543.96  1.6203E 00  3.8156E-01  5.1419E-04  2.0717E-03  1.3044E 02  6.4944E-04
  51   .7583     90.0     541.25  1.4933E 00  3.8900E-01  5.2232E-04  2.1047E-03  1.2980E 02  6.5980E-04
  52   .7996     90.0     542.22  1.7202E 00  4.4810E-01  6.0247E-04  2.4275E-03  1.3003E 02  7.6100E-04
  53   .8409     90.0     542.63  2.2537E 00  5.6460E-01  7.5952E-04  3.0603E-03  1.3013E 02  9.5935E-04
  54   .8822     90.0     544.06  2.7750E 00  6.8119E-01  9.1812E-04  3.6990E-03  1.3047E 02  1.1596E-03
  55   .9235     90.0     544.02  3.2774E 00  7.8815E-01  1.0622E-03  4.2797E-03  1.3046E 02  1.3416E-03
  56   .9648     90.0     545.12  3.6977E 00  8.8923E-01  1.2002E-03  4.8354E-03  1.3072E 02  1.5158E-03
  57   .2524    135.0     523.60  3.8709E-01  1.1443E-01  1.5009E-04  6.0537E-04  1.2560E 02  1.8978E-04
  58   .2943    135.0     525.85  2.0331E 00  6.5184E-01  8.5752E-04  3.4583E-03  1.2614E 02  1.0841E-03
  59   .3363    135.0     525.61  1.6348E 00  5.1599E-01  6.7860E-04  2.7367E-03  1.2608E 02  8.5793E-04
  60   .3783    135.0     524.42  1.7591E 00  5.4644E-01  7.1750E-04  2.8938E-03  1.2579E 02  9.0718E-04
  61   .4203    135.0     527.59  1.8231E 00  5.4802E-01  7.2259E-04  2.9139E-03  1.2655E 02  9.1345E-04
  62   .4623    135.0     528.59  1.6599E 00  4.8231E-01  6.3679E-04  2.5677E-03  1.2679E 02  8.0495E-04
  63   .5043    135.0     529.70  1.8125E 00  4.6311E-01  6.1234E-04  2.4690E-03  1.2705E 02  7.7399E-04
  64   .5463    135.0     530.62  1.7393E 00  4.6188E-01  6.1143E-04  2.4652E-03  1.2727E 02  7.7281E-04
  65   .5882    135.0     531.78  1.6868E 00  4.4792E-01  5.9389E-04  2.3943E-03  1.2755E 02  7.5059E-04
  66   .6302    135.0     533.09  1.8819E 00  4.9974E-01  6.6374E-04  2.6758E-03  1.2786E 02  8.3881E-04
  67   .6722    135.0     537.66  2.0192E 00  4.8558E-01  6.4886E-04  2.6151E-03  1.2894E 02  8.1980E-04
  68   .7170    135.0     539.06  2.0893E 00  4.9201E-01  6.5869E-04  2.6545E-03  1.2928E 02  8.3216E-04
  69   .7583    135.0     536.16  1.4026E 00  3.9355E-01  5.2485E-04  2.1155E-03  1.2859E 02  6.6318E-04
  70   .7996    135.0     538.63  2.3505E 00  6.8297E-01  9.1383E-04  3.6828E-03  1.2918E 02  1.1545E-03
  71   .8409    135.0     540.47  2.7184E 00  7.4901E-01  1.0047E-03  4.0485E-03  1.2961E 02  1.2692E-03
  72   .8822    135.0     541.62  3.5203E 00  9.5239E-01  1.2794E-03  5.1559E-03  [illegible]  [illegible]
  73   .9235    135.0     543.16  4.1425E 00  1.0169E 00  1.3689E-03  5.5154E-03  1.3026E 02  1.7290E-03
  74   .9648    135.0     544.53  4.6474E 00  1.1176E 00  1.5073E-03  6.0726E-03  1.3058E 02  1.9037E-03
  75   .2524    180.0     526.17  2.6058E 00  7.5713E-01  9.9645E-04  4.0185E-03  1.2621E 02  1.2598E-03
  76   .2943    180.0     528.78  1.2972E 00  4.1590E-01  5.4925E-04  2.2147E-03  1.2683E 02  6.9428E-04
  77   .3363    180.0     529.45  1.9711E 00  5.8269E-01  7.7019E-04  3.1055E-03  1.2699E 02  9.7353E-04
  78   .3783    180.0     530.59  2.0082E 00  6.0346E-01  7.9912E-04  3.2219E-03  1.2726E 02  1.0100E-03
  79   .4203    180.0     532.55  1.9836E 00  5.8637E-01  7.7824E-04  3.1374E-03  1.2773E 02  9.8355E-04
  80   .4623    180.0     533.95  2.0272E 00  5.7892E-01  7.6979E-04  3.1031E-03  1.2806E 02  9.7279E-04
  81   .5043    180.0     535.03  1.8981E 00  4.7552E-01  6.3321E-04  2.5524E-03  1.2832E 02  8.0014E-04
  82   .5463    180.0     536.11  1.8436E 00  4.8956E-01  6.5284E-04  2.6314E-03  1.2857E 02  8.2490E-04
  83   .5882    180.0     537.25  1.4649E 00  4.4212E-01  5.9048E-04  2.3799E-03  1.2885E 02  7.4606E-04
  84   .6302    180.0     537.67 -1.1578E-03 -3.0745E-04 -4.1085E-07 -1.6558E-06  1.2895E 02 -5.1909E-07
  85   .6722    180.0     543.98  2.2866E 00  5.4988E-01  7.4106E-04  2.9857E-03  1.3045E 02  9.3597E-04
  86   .7170    180.0     545.26  2.3586E 00  5.5542E-01  7.4982E-04  3.0208E-03  1.3075E 02  9.4697E-04
  87   .7583    180.0     543.59  1.9973E 00  4.8030E-01  6.4691E-04  2.6064E-03  1.3035E 02  8.1708E-04
  88   .7996    180.0     545.36  2.7799E 00  7.2417E-01  9.7776E-04  3.9390E-03  1.3078E 02  1.2348E-03
  89   .8409    180.0     547.04  3.6443E 00  9.3115E-01  1.2601E-03  5.0761E-03  1.3118E 02  1.5913E-03
  90   .8822    180.0     548.42  4.4391E 00  1.0229E 00  1.3869E-03  5.5863E-03  1.3151E 02  1.7512E-03
  91   .9235    180.0     549.23  5.0281E 00  1.2343E 00  1.6752E-03  6.7474E-03  1.3170E 02  2.1152E-03
  92   .9648    180.0     551.21  5.6063E 00  1.2919E 00  1.7582E-03  7.0809E-03  1.3217E 02  2.2198E-03
  93   .8822    225.0     550.30  3.4779E 00  8.8063E-01  1.2079E-03  4.8648E-03  1.3196E 02  1.5250E-03
  94   .9648    225.0     551.59  4.6087E 00  1.1083E 00  1.5091E-03  6.0776E-03  1.3226E 02  1.9052E-03
  95   .7170    270.0     549.15  1.0537E 00  2.3755E-01  3.2238E-04  1.2985E-03  1.3168E 02  4.0706E-04
  96   .7996    270.0     551.62  1.8412E 00  4.8892E-01  6.6576E-04  2.6812E-03  1.3227E 02  8.4052E-04
  97   .8822    270.0     552.90  2.6467E 00  6.7626E-01  9.2247E-04  3.7148E-03  1.3250E 02  1.1645E-03
  98   .9648    270.0     552.61  3.7871E 00  8.9148E-01  1.2156E-03  4.8951E-03  1.3251E 02  1.5346E-03
```

GROUP 34

5° ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE

SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP P4
MACH NO = 8
RE NO = 1.31 X 10**6
CONFIG 1
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.98
32.00
24.00
16.00
8.00
0.00
-8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
CH X 10**4
16.00
**4

2

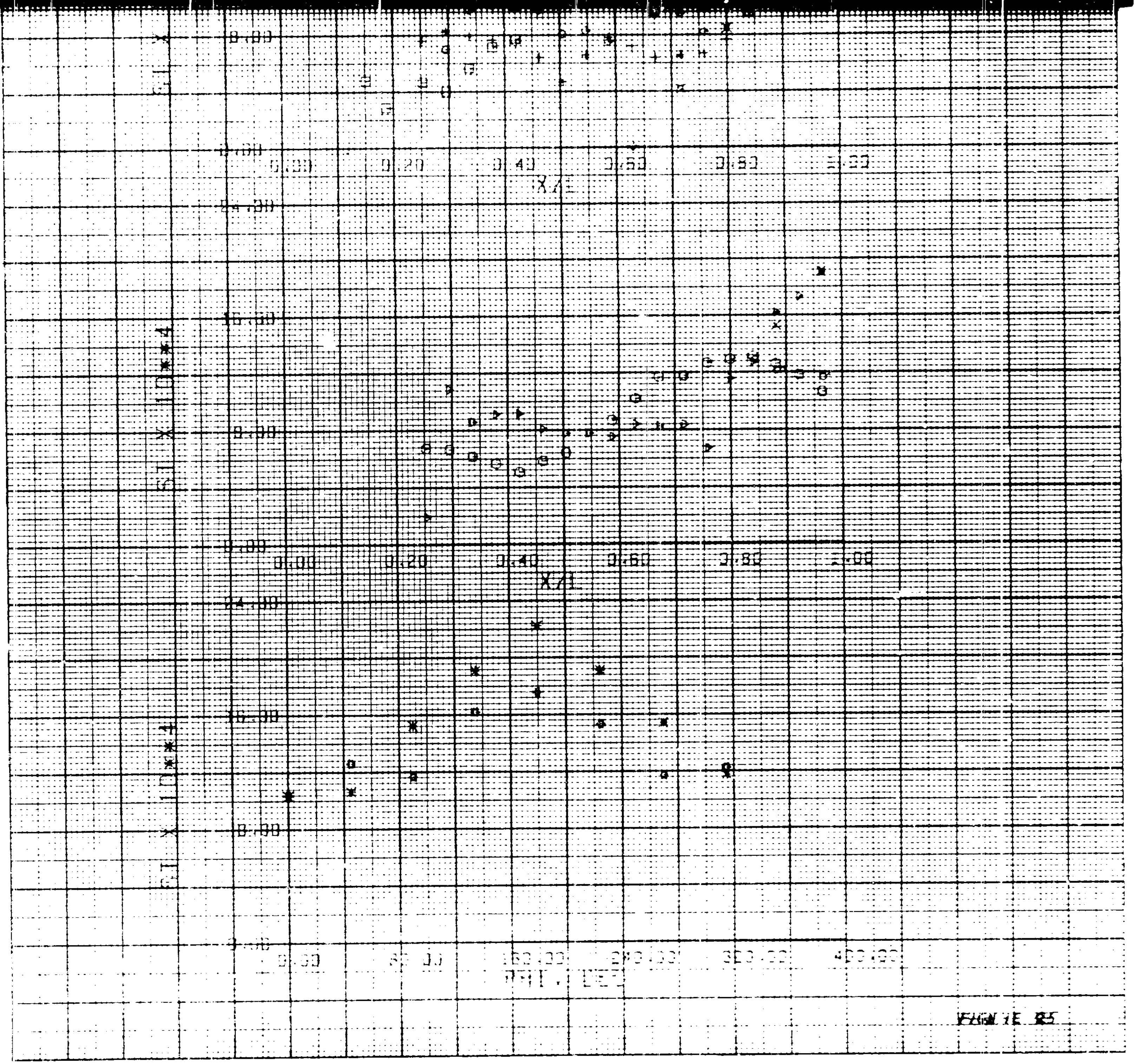
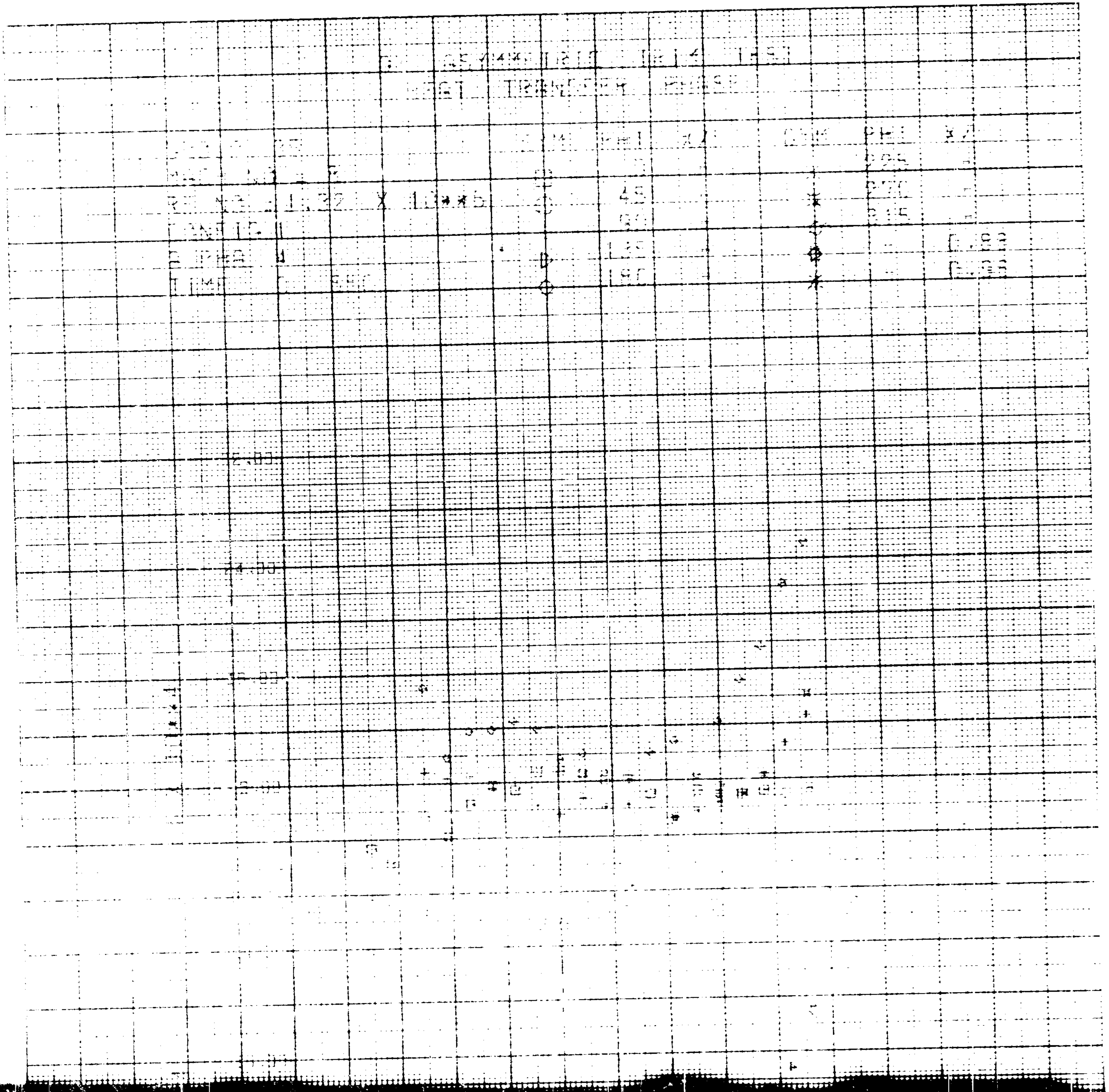

S1 X 10**4
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
8.00
0.00
X/L
S1 X 10**4
24.00
16.00
8.00
0.00
S1 X 10**4
0.00
80.00
160.00
240.00
320.00
400.00
PHI, DEG
FIGURE 25

Figure 25

3

```
                                        7/14/69

                          AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                           VON KARMAN GAS DYNAMICS FACILITY
                             50 INCH HYPERSONIC TUNNEL B
                                     VT0967-H00
GROUP  CONFIG     ALPHA-M      BETA-M       ALPHA-S      ROLL    ALP-P   DATE      MACH NO        PO          TO          TIME
 35       1          3.94          0           3.94          0       0     715        7.97        280.70      1266.00       -.00
   T-INF       P-INF        Q-INF        V-INF       RHO-INF       MU INF       RE/FT        RE/D          HO
 9.38400E 01 2.94701E-02 1.31039E 00 3.78310E 03 2.63405E-05 7.55506E-08 1.11937E 06 1.20996E 06 3.14062E 02

TC NO    X/L      PHI     TEMP     SLOPE        Q-STOR       HT           HH           HW          ST

   1   .1536       0    528.81  9.3121E-01  2.0243E-01  2.6734E-04  1.0780E-03  1.2684E 02  3.3613E-04
   2   .1867       0    527.32  6.3229E-01  1.3886E-01  1.8303E-04  7.3808E-04  1.2649E 02  2.3014E-04
   3   .2524       0    528.43  1.1530E 00  3.4084E-01  4.4991E-04  1.8142E-03  1.2675E 02  5.6569E-04
   4   .2943       0    533.25  7.9496E-01  2.5091E-01  3.3333E-04  1.3437E-03  1.2789E 02  4.1899E-04
   5   .3363       0    535.47  1.2326E 00  3.8905E-01  5.1836E-04  2.0894E-03  1.2842E 02  6.5150E-04
   6   .3783       0    536.81  1.5470E 00  4.6504E-01  6.2072E-04  2.5018E-03  1.2874E 02  7.8009E-04
   7   .4203       0    537.34  1.5303E 00  4.4486E-01  5.9394E-04  2.3938E-03  1.2887E 02  7.4641E-04
   8   .4623       0    538.49  1.8907E 00  5.2094E-01  6.9690E-04  2.8086E-03  1.2914E 02  8.7579E-04
   9   .5043       0    538.71  1.9496E 00  5.2745E-01  7.0581E-04  2.8445E-03  1.2919E 02  8.8694E-04
  10   .5463       0    540.33  1.8169E 00  5.0978E-01  6.8365E-04  2.7549E-03  1.2958E 02  8.5902E-04
  11   .5882       0    541.46  1.7429E 00  4.8021E-01  6.4498E-04  2.5989E-03  1.2985E 02  8.1038E-04
  12   .6302       0    542.51  1.7799E 00  4.8153E-01  6.4766E-04  2.6096E-03  1.3010E 02  8.1370E-04
  13   .6722       0    542.66  1.6515E 00  4.1375E-01  5.5659E-04  2.2426E-03  1.3013E 02  6.9927E-04
  99   .8822   315.0    552.85  2.3031E 00  5.9998E-01  8.1834E-04  3.2954E-03  1.3256E 02  1.0276E-03
  15   .7583       0    546.52  1.7656E 00  4.2458E-01  5.7416E-04  2.3129E-03  1.3105E 02  7.2120E-04
  16   .7996       0    548.33  1.5570E 00  4.3702E-01  5.9244E-04  2.3863E-03  1.3149E 02  7.4408E-04
  17   .8409       0    548.99  1.5035E 00  4.0459E-01  5.4897E-04  2.2112E-03  1.3164E 02  6.8946E-04
  18   .8822       0    549.73  1.6703E 00  4.1845E-01  5.6834E-04  2.2891E-03  1.3182E 02  7.1376E-04
  19   .9235       0    549.43  1.6084E 00  4.0294E-01  5.4705E-04  2.2034E-03  1.3175E 02  6.8703E-04
  20   .9648       0    548.34  1.7741E 00  4.2664E-01  5.7837E-04  2.3297E-03  1.3149E 02  7.2641E-04
  21   .2524    45.0    526.83  1.1623E 00  3.4359E-01  4.5258E-04  1.8251E-03  1.2637E 02  5.6909E-04
  22   .2943    45.0    531.50  1.0099E 00  3.2380E-01  4.2916E-04  1.7302E-03  1.2748E 02  5.3950E-04
  23   .3363    45.0    533.75  1.0410E 00  3.1294E-01  4.1600E-04  1.6770E-03  1.2801E 02  5.2290E-04
  24   .3783    45.0    534.94  9.6302E-01  2.8966E-01  3.8567E-04  1.5546E-03  1.2830E 02  4.8474E-04
  25   .4203    45.0    536.89  9.0566E-01  2.6315E-01  3.5128E-04  1.4158E-03  1.2876E 02  4.4147E-04
  26   .4623    45.0    539.59  9.8761E-01  2.7710E-01  3.7125E-04  1.4961E-03  1.2940E 02  4.6649E-04
  27   .5043    45.0    540.29  9.2815E-01  2.4647E-01  3.3051E-04  1.3319E-03  1.2957E 02  4.1530E-04
 100   .9648   315.0    553.26  2.5852E 00  6.2170E-01  8.4845E-04  3.4166E-03  1.3266E 02  1.0553E-03
  29   .5882    45.0    542.75  1.1100E 00  3.0599E-01  4.1170E-04  1.6588E-03  1.3016E 02  5.1723E-04
  30   .6302    45.0    544.01  1.2495E 00  3.3804E-01  4.5559E-04  1.8355E-03  1.3046E 02  5.7233E-04
  31   .6722    45.0    545.30  1.5913E 00  3.9062E-01  5.2737E-04  2.1245E-03  1.3076E 02  6.6246E-04
  32   .7170    45.0    547.04  1.7546E 00  4.1320E-01  5.5916E-04  2.2525E-03  1.3118E 02  7.0234E-04
  33   .7583    45.0    548.76  1.6724E 00  4.6080E-01  6.2504E-04  2.5176E-03  1.3159E 02  7.8501E-04
  34   .7996    45.0    550.52  1.9343E 00  5.4272E-01  7.3791E-04  2.9720E-03  1.3201E 02  9.2668E-04
  35   .8409    45.0    552.09  2.1560E 00  5.8165E-01  7.9250E-04  3.1915E-03  1.3237E 02  9.9515E-04
  36   .8822    45.0    552.89  2.2893E 00  6.0213E-01  8.2134E-04  3.3075E-03  1.3257E 02  1.0313E-03
  37   .9235    45.0    553.05  2.4361E 00  6.2246E-01  8.4925E-04  3.4199E-03  1.3261E 02  1.0663E-03
  38   .9648    45.0    552.66  2.4493E 00  5.8902E-01  8.0320E-04  3.2345E-03  1.3252E 02  1.0085E-03
  39   .2524    90.0    530.74  1.8042E 00  5.3334E-01  7.0617E-04  2.8472E-03  1.2730E 02  8.8777E-04
  40   .2943    90.0    535.03  1.5626E 00  5.0100E-01  6.6714E-04  2.6892E-03  1.2832E 02  8.3851E-04
  41   .3363    90.0    536.65  1.6122E 00  5.0885E-01  6.7905E-04  2.7369E-03  1.2870E 02  8.5340E-04
  42   .3783    90.0    538.37  1.4321E 00  4.5200E-01  6.0459E-04  2.4366E-03  1.2911E 02  7.5975E-04
  43   .4203    90.0    539.82  1.6056E 00  4.7462E-01  6.3607E-04  2.5633E-03  1.2946E 02  7.9926E-04
  44   .4623    90.0    540.23  1.7036E 00  3.7389E-01  5.0135E-04  2.0203E-03  1.2956E 02  6.2995E-04
  45   .5043    90.0    541.52  1.2039E 00  3.3171E-01  4.4556E-04  1.7954E-03  1.2986E 02  5.5982E-04
  46   .5463    90.0    543.31  1.4199E 00  4.0547E-01  5.4595E-04  2.1997E-03  1.3029E 02  6.8588E-04
  47   .5882    90.0    543.81  1.2901E 00  3.6199E-01  4.8773E-04  1.9650E-03  1.3041E 02  6.1272E-04
  48   .6302    90.0    543.85  1.3466E 00  3.7104E-01  4.9995E-04  2.0143E-03  1.3042E 02  6.2808E-04
  49   .6722    90.0    544.70  1.4187E 00  3.5542E-01  4.7945E-04  1.9316E-03  1.3062E 02  6.0229E-04
  50   .7170    90.0    546.50  1.3089E 00  3.0823E-01  4.1681E-04  1.6790E-03  1.3105E 02  5.2354E-04
  51   .7583    90.0    546.29  1.2975E 00  3.3801E-01  4.5694E-04  1.8408E-03  1.3100E 02  5.7397E-04
  52   .7996    90.0    547.59  1.5686E 00  4.0861E-01  5.5336E-04  2.2290E-03  1.3131E 02  6.9503E-04
  53   .8409    90.0    548.22  1.6394E 00  4.1071E-01  5.5669E-04  2.2423E-03  1.3146E 02  6.9918E-04
  54   .8822    90.0    549.49  2.0068E 00  4.9260E-01  6.6883E-04  2.6939E-03  1.3176E 02  8.3998E-04
  55   .9235    90.0    549.15  2.5979E 00  6.2475E-01  8.4786E-04  3.4150E-03  1.3168E 02  1.0648E-03
  56   .9648    90.0    548.62  3.0744E 00  7.3933E-01  1.0026E-03  4.0386E-03  1.3155E 02  1.2593E-03
  57   .2524   135.0    526.54  4.7620E-01  1.4077E-01  1.8535E-04  7.4749E-04  1.2630E 02  2.3307E-04
  58   .2943   135.0    530.68  2.4842E 00  7.9649E-01  1.0545E-03  4.2515E-03  1.2728E 02  1.3257E-03
  59   .3363   135.0    531.04  2.0717E 00  6.5390E-01  8.6614E-04  3.4921E-03  1.2737E 02  1.0889E-03
  60   .3783   135.0    529.92  2.0603E 00  6.4000E-01  8.4647E-04  3.4130E-03  1.2710E 02  1.0642E-03
  61   .4203   135.0    533.10  2.0701E 00  6.2228E-01  8.2651E-04  3.3319E-03  1.2786E 02  1.0389E-03
  62   .4623   135.0    534.16  1.9259E 00  5.5958E-01  7.4429E-04  3.0003E-03  1.2811E 02  9.3552E-04
  63   .5043   135.0    535.32  2.0766E 00  5.3060E-01  7.0602E-04  2.8491E-03  1.2839E 02  8.8837E-04
  64   .5463   135.0    536.11  2.0130E 00  5.3455E-01  7.1283E-04  2.8732E-03  1.2858E 02  8.9589E-04
  65   .5882   135.0    537.19  1.9352E 00  5.1388E-01  6.8626E-04  2.7659E-03  1.2883E 02  8.6245E-04
  66   .6302   135.0    537.68  2.0041E 00  5.3219E-01  7.1118E-04  2.8663E-03  1.2895E 02  8.9373E-04
  67   .6722   135.0    540.31  2.0079E 00  4.8286E-01  6.4753E-04  2.6094E-03  1.2958E 02  8.1363E-04
  68   .7170   135.0    541.29  1.9559E 00  4.6060E-01  6.1850E-04  2.4923E-03  1.2981E 02  7.7711E-04
  69   .7583   135.0    540.64  1.4012E 00  3.9316E-01  5.2747E-04  2.1255E-03  1.2965E 02  6.6276E-04
  70   .7996   135.0    542.08  2.7431E 00  6.5174E-01  8.7704E-04  3.5337E-03  1.3007E 02  1.1019E-03
  71   .8409   135.0    543.89  2.4220E 00  6.6733E-01  8.9923E-04  3.6229E-03  1.3043E 02  1.1297E-03
  72   .8822   135.0    544.65  2.9012E 00  [illegible]  1.0587E-03  4.2654E-03  1.3061E 02  1.3300E-03
  73   .9235   135.0    545.27  3.5711E 00  8.7659E-01  1.1834E-03  4.7676E-03  1.3076E 02  1.4866E-03
  74   .9648   135.0    548.65  4.6973E 00  1.1296E 00  1.5320E-03  6.1707E-03  1.3156E 02  1.9241E-03
  75   .2524   180.0    527.42  3.1146E 00  9.0498E-01  1.1930E-03  4.8108E-03  1.2651E 02  1.5001E-03
  76   .2943   180.0    532.01  1.8470E 00  5.9218E-01  7.8540E-04  3.1664E-03  1.2760E 02  9.8731E-04
  77   .3363   180.0    534.32  2.3902E 00  7.0657E-01  9.3999E-04  3.7891E-03  1.2815E 02  1.1815E-03
  78   .3783   180.0    535.49  2.3584E 00  7.0893E-01  9.4459E-04  3.8075E-03  1.2843E 02  1.1872E-03
  79   .4203   180.0    536.99  2.5162E 00  7.4380E-01  9.9305E-04  4.0024E-03  1.2879E 02  1.2480E-03
  80   .4623   180.0    538.28  2.4889E 00  7.1075E-01  9.5056E-04  3.8309E-03  1.2909E 02  1.1945E-03
  81   .5043   180.0    539.48  2.2925E 00  5.7431E-01  7.6932E-04  3.1003E-03  1.2938E 02  9.6671E-04
  82   .5463   180.0    540.84  2.2456E 00  5.9637E-01  8.0027E-04  3.2248E-03  1.2970E 02  1.0055E-03
  83   .5882   180.0    541.91  1.9182E 00  5.0936E-01  6.8455E-04  2.7583E-03  1.2996E 02  8.6007E-04
  84   .6302   180.0    537.91  6.1424E-02  1.6311E-02  2.1804E-05  8.7875E-05  1.2900E 02  2.7400E-05
  85   .6722   180.0    546.20  2.4630E 00  5.9245E-01  8.0062E-04  3.2261E-03  1.3098E 02  1.0059E-03
  86   .7170   180.0    547.57  2.7164E 00  6.3970E-01  8.6629E-04  3.4895E-03  1.3130E 02  1.0881E-03
  87   .7583   180.0    547.13  2.0410E 00  4.9096E-01  6.6448E-04  2.6767E-03  1.3120E 02  8.3461E-04
  88   .7996   180.0    549.58  2.7520E 00  7.1710E-01  9.7377E-04  3.9221E-03  1.3178E 02  1.2229E-03
  89   .8409   180.0    550.54  3.4971E 00  8.9355E-01  1.2149E-03  4.8932E-03  1.3201E 02  1.5257E-03
  90   .8822   180.0    551.73  4.4683E 00  1.0297E 00  1.4023E-03  5.6475E-03  1.3230E 02  1.7609E-03
  91   .9235   180.0    552.99  5.2784E 00  1.2957E 00  1.7676E-03  7.1181E-03  1.3260E 02  2.2195E-03
  92   .9648   180.0    554.95  6.3597E 00  1.4655E 00  2.0047E-03  8.0720E-03  1.3306E 02  2.5169E-03
  93   .8822   225.0    553.67  2.8767E 00  7.3503E-01  1.0036E-03  4.0414E-03  1.3275E 02  1.2601E-03
  94   .9648   225.0    555.40  4.5049E 00  1.0838E 00  1.4835E-03  5.9731E-03  1.3317E 02  1.8625E-03
  95   .7170   270.0    551.10  1.3378E 00  3.0161E-01  4.1041E-04  1.6529E-03  1.3215E 02  5.1538E-04
  96   .7996   270.0    555.32  1.4232E 00  3.7793E-01  5.1728E-04  2.0828E-03  1.3317E 02  6.4943E-04
  97   .8822   270.0    557.21  1.8029E 00  4.8109E-01  6.6012E-04  2.6577E-03  1.3360E 02  8.2869E-04
  98   .9648   270.0    555.81  3.4107E 00  8.2828E-01  1.1233E-03  4.5227E-03  1.3327E 02  1.4102E-03
```


HEAT TRANSFER PHASE
RE/D = 1.32 X 10**5
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.83
5.00
4.00
3.00
2.00

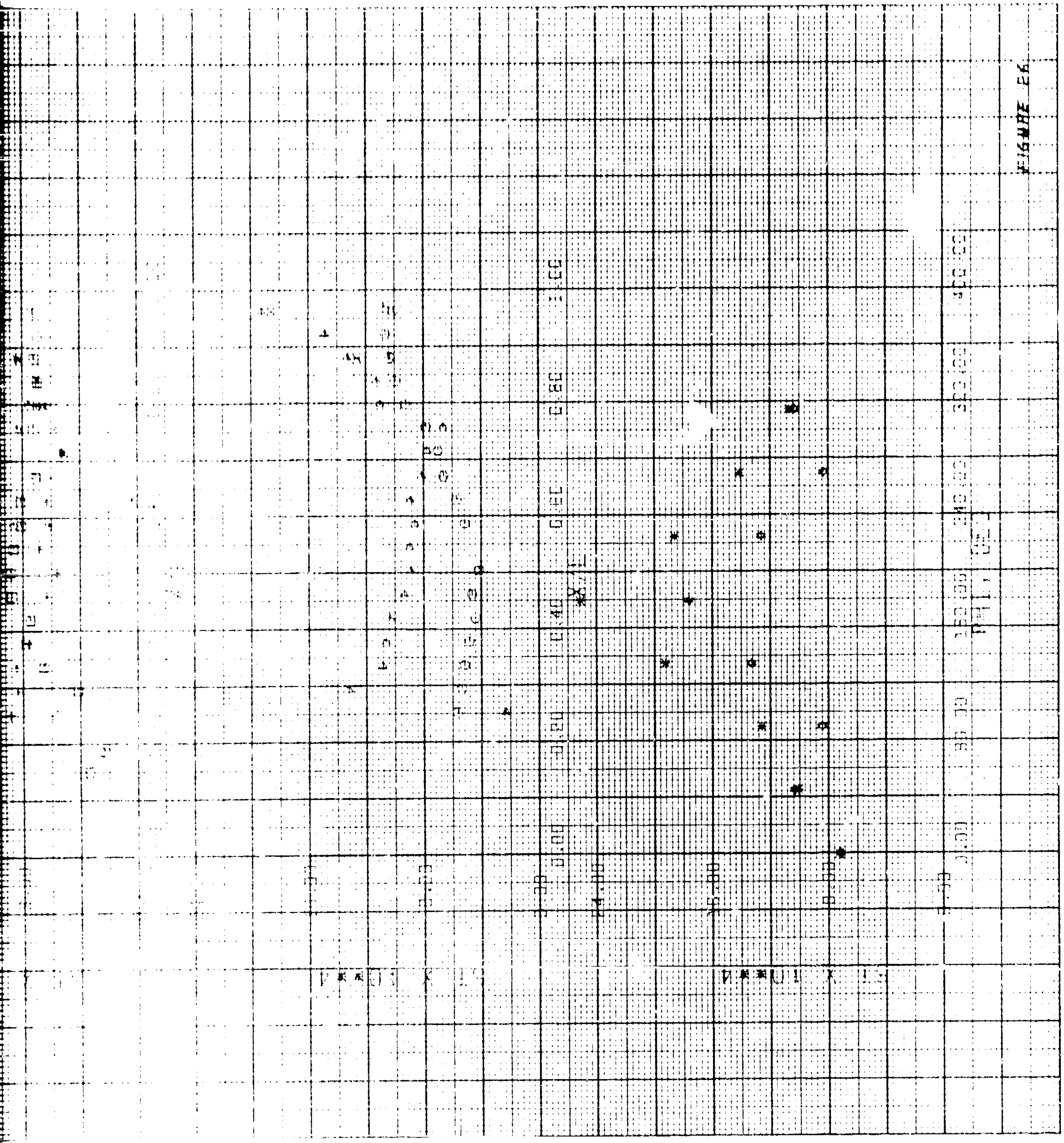
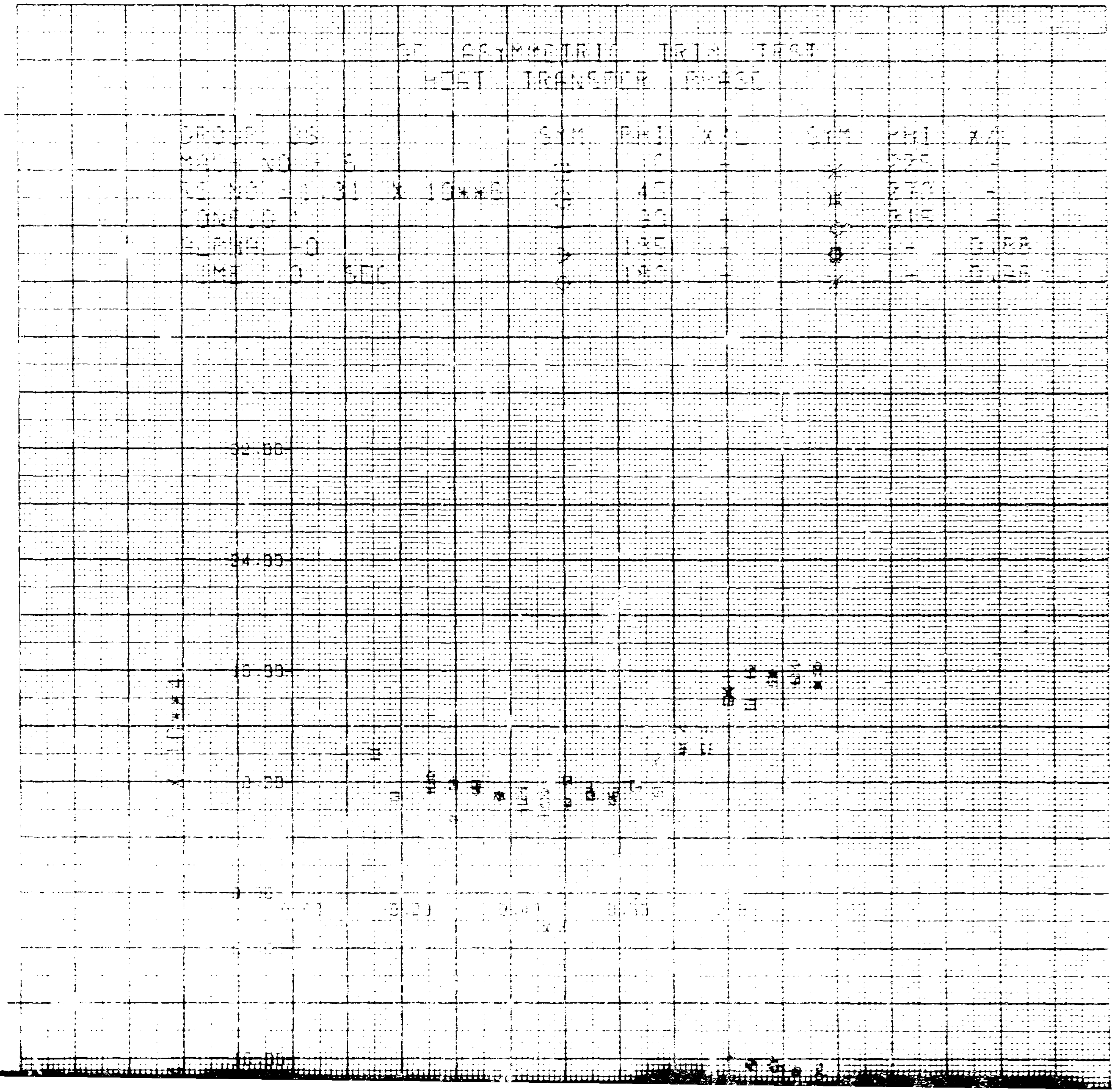


FIGURE 26
0.00
0.20
0.40
0.60
0.80
1.00
0.00
80.00
160.00
240.00
320.00
400.00

Figure 26

```
                                              7/14/69

                              AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
                               VON KARMAN GAS DYNAMICS FACILITY
                                 50 INCH HYPERSONIC TUNNEL B
                                         V10967-H00
GROUP   CONFIG    ALPHA-M      BETA-M       ALPHA-S     ROLL   ALP-P   DATE      MACH NO        PO           TO          TIME
 16        1        -.06          0           -.05         0      0     715        7.97        219.56      1286.00        -.00
   T-INF          P-INF        Q-INF        V-INF        RHO-INF       MU-INF        RE/FT         RE/L         HO
 9.1046E 01   2.93230E-02  1.30304E 00  3.78318E 03   2.02172E-05   7.55506E 03  1.31270E 06  1.20382E 06  5.16022E 02

TC NO    X/L      PHI      TEMP      SLOPE        Q-STDM       HT           HH          HW          ST

   1   .1508       0     524.52   2.7825E 00   5.848?E-01   7.9650E-04  3.2172E-03  1.2652E 02  1.0066E-03
   2   .1887       0     525.67   1.3153E 00   4.2003E-01   5.5323E-04  2.2311E-03  1.2629E 02  6.9918E-04
   3   .2524       0     526.50   1.5999E 00   4.7295E-01   6.2279E-04  2.5116E-03  1.2631E 02  7.8706E-04
   4   .2943       0     530.34   1.6836E 00   4.6820E-01   6.1960E-04  2.4982E-03  1.2720E 02  7.8286E-04
   5   .3363       0     531.76   1.6856E 00   4.6889E-01   5.2167E-04  2.5063E-03  1.2754E 02  7.0542E-04
   6   .3783       0     532.82   1.3904E 00   4.1796E-01   5.5492E-04  2.2371E-03  1.2779E 02  7.0105E-04
   7   .4203       0     533.20   1.3819E 00   4.0157E-01   5.3339E-04  2.1503E-03  1.2788E 02  6.7385E-04
   8   .4623       0     534.60   1.4157E 00   3.9007E-01   5.1904E-04  2.0923E-03  1.2819E 02  6.5566E-04
   9   .5043       0     534.83   1.7939E 00   4.8532E-01   6.4609E-04  2.6043E-03  1.2827E 02  8.1613E-04
  10   .5463       0     536.59   1.4904E 00   4.1018E-01   5.5801E-04  2.2491E-03  1.2869E 02  7.0480E-04
  11   .5882       0     537.64   1.5660E 00   4.3198E-01   5.7657E-04  2.3237E-03  1.2894E 02  7.2820E-04
  12   .6302       0     539.29   1.6003E 00   4.5450E-01   6.0877E-04  2.4533E-03  1.2933E 02  7.6881E-04
  13   .6722       0     541.73   1.7287E 00   4.3306E-01   5.8144E-04  2.3440E-03  1.2992E 02  7.3474E-04
  99   .8822    315.0    548.41   3.4594E 00   9.0117E-01   1.2210E-03  4.9212E-03  1.3150E 02  1.5422E-03
  15   .7583       0     543.30   2.5543E 00   6.1426E-01   8.2706E-04  3.3323E-03  1.3029E 02  1.0443E-03
  16   .7996       0     544.21   2.4991E 00   8.1350E-01   1.0967E-03  4.4189E-03  1.3050E 02  1.3865E-03
  17   .8409       0     544.77   3.1249E 00   7.9869E-01   1.0775E-03  4.3410E-03  1.3064E 02  1.3604E-03
  18   .8822       0     545.79   3.5813E 00   8.9770E-01   1.2127E-03  4.8854E-03  1.3087E 02  1.5310E-03
  19   .9235       0     545.81   3.6294E 00   9.0923E-01   1.2284E-03  4.9486E-03  1.3089E 02  1.5508E-03
  20   .9648       0     547.27   3.9112E 00   9.4056E-01   1.2732E-03  5.1288E-03  1.3123E 02  1.6072E-03
  21   .2524     45.0    526.72   1.7003E 00   5.0261E-01   6.6024E-04  2.6629E-03  1.2587E 02  8.3447E-04
  22   .2943     45.0    528.27   1.5574E 00   4.6727E-01   6.1062E-04  2.4860E-03  1.2671E 02  7.7925E-04
  23   .3363     45.0    529.84   1.4443E 00   4.3419E-01   5.7615E-04  2.3150E-03  1.2709E 02  7.2566E-04
  24   .3783     45.0    531.09   1.3713E 00   4.1281E-01   5.4684E-04  2.2047E-03  1.2738E 02  6.9090E-04
  25   .4203     45.0    532.71   1.2510E 00   3.6349E-01   4.8253E-04  1.9453E-03  1.2777E 02  6.0960E-04
  26   .4623     45.0    535.42   1.3803E 00   3.8721E-01   5.1588E-04  2.0794E-03  1.2841E 02  6.5164E-04
  27   .5043     45.0    536.77   1.5359E 00   4.0774E-01   5.4421E-04  2.1934E-03  1.2873E 02  6.8737E-04
 100   .9648    315.0    551.98   3.5793E 00   8.6075E-01   1.1727E-03  4.7225E-03  1.3216E 02  1.4799E-03
  29   .5882     45.0    538.62   1.6531E 00   4.5547E-01   6.0743E-04  2.4561E-03  1.2917E 02  7.6966E-04
  30   .6302     45.0    540.49   1.6779E 00   4.5395E-01   6.0888E-04  2.4536E-03  1.2961E 02  7.6890E-04
  31   .6722     45.0    544.30   2.0033E 00   4.9171E-01   6.6364E-04  2.6713E-03  1.3055E 02  8.3711E-04
  32   .7170     45.0    545.88   2.4502E 00   5.7700E-01   7.7961E-04  3.1407E-03  1.3091E 02  9.8421E-04
  33   .7583     45.0    544.90   2.9035E 00   7.1456E-01   9.6421E-04  3.8844E-03  1.3067E 02  1.2173E-03
  34   .7996     45.0    545.75   3.0150E 00   8.5613E-01   1.1670E-03  4.6048E-03  1.3087E 02  1.4430E-03
  35   .8409     45.0    547.57   3.1750E 00   9.1324E-01   1.2368E-03  4.9819E-03  1.3130E 02  1.5612E-03
  36   .8822     45.0    548.17   3.4565E 00   9.0814E-01   1.2321E-03  4.9629E-03  1.3144E 02  1.5552E-03
  37   .9235     45.0    548.43   3.4628E 00   8.8479E-01   1.1996E-03  4.8319E-03  1.3151E 02  1.5142E-03
  38   .9648     45.0    554.55   3.3989E 00   8.1737E-01   1.1114E-03  4.4761E-03  1.3261E 02  1.4027E-03
  39   .2524     90.0    527.59   1.4825E 00   4.3823E-01   5.7782E-04  2.3301E-03  1.2655E 02  7.3019E-04
  40   .2943     90.0    530.99   1.9250E 00   4.8920E-01   6.4796E-04  2.6123E-03  1.2736E 02  8.1864E-04
  41   .3363     90.0    532.05   1.4504E 00   4.5778E-01   6.0718E-04  2.4479E-03  1.2761E 02  7.6710E-04
  42   .3783     90.0    533.44   1.3422E 00   4.2365E-01   5.6294E-04  2.2694E-03  1.2794E 02  7.1116E-04
  43   .4203     90.0    534.98   1.1970E 00   3.5384E-01   4.7115E-04  1.8991E-03  1.2831E 02  5.9514E-04
  44   .4623     90.0    536.82   1.0775E 00   3.3470E-01   4.4557E-04  1.7961E-03  1.2827E 02  5.6204E-04
  45   .5043     90.0    536.59   1.3570E 00   3.7390E-01   4.9892E-04  2.0109E-03  1.2869E 02  6.3017E-04
  46   .5463     90.0    538.25   1.5678E 00   4.4770E-01   5.9874E-04  2.4130E-03  1.2909E 02  7.5618E-04
  47   .5882     90.0    539.14   1.4011E 00   4.1557E-01   5.5642E-04  2.2424E-03  1.2930E 02  7.0270E-04
  48   .6302     90.0    540.19   1.7523E 00   4.8282E-01   6.4733E-04  2.6086E-03  1.2954E 02  8.1747E-04
  49   .6722     90.0    543.54   2.1067E 00   5.4780E-01   7.3702E-04  2.9727E-03  1.3034E 02  9.3157E-04
  50   .7170     90.0    545.47   2.5258E 00   5.9479E-01   8.0326E-04  3.2358E-03  1.3080E 02  1.0140E-03
  51   .7583     90.0    542.58   2.6375E 00   6.8708E-01   9.2422E-04  3.7239E-03  1.3012E 02  1.1670E-03
  52   .7996     90.0    543.36   3.5231E 00   9.1776E-01   1.2350E-03  4.9791E-03  1.3030E 02  1.5603E-03
  53   .8409     90.0    543.84   3.6416E 00   9.1229E-01   1.2292E-03  4.9525E-03  1.3042E 02  1.5520E-03
  54   .8822     90.0    544.77   3.7826E 00   9.2852E-01   1.2527E-03  5.0467E-03  1.3064E 02  1.5815E-03
  55   .9235     90.0    544.98   3.6950E 00   8.8876E-01   1.1994E-03  4.8319E-03  1.3069E 02  1.5142E-03
  56   .9648     90.0    546.36   3.6358E 00   8.7434E-01   1.1816E-03  4.7602E-03  1.3095E 02  1.4917E-03
  57   .2524    135.0    523.25   3.4272E-01   1.0131E-01   1.3282E-04  5.3575E-04  1.2552E 02  1.6789E-04
  58   .2943    135.0    524.92   1.4183E 00   5.1886E-01   6.8174E-04  2.7495E-03  1.2591E 02  8.6163E-04
  59   .3363    135.0    526.02   1.3031E 00   4.1129E-01   5.4118E-04  2.1825E-03  1.2610E 02  6.8394E-04
  60   .3783    135.0    524.90   1.1592E 00   4.2222E-01   5.5453E-04  2.2365E-03  1.2584E 02  7.0000E-04
  61   .4203    135.0    528.12   1.4494E 00   4.3568E-01   5.7487E-04  2.3181E-03  1.2660E 02  7.2643E-04
  62   .4623    135.0    529.43   1.4749E 00   4.2856E-01   5.6645E-04  2.2840E-03  1.2659E 02  7.1574E-04
  63   .5043    135.0    530.75   1.5587E 00   3.9826E-01   5.2731E-04  2.1260E-03  1.2730E 02  6.6625E-04
  64   .5463    135.0    531.67   1.6055E 00   4.2633E-01   5.6517E-04  2.2786E-03  1.2752E 02  7.1404E-04
  65   .5882    135.0    532.59   1.7394E 00   4.6189E-01   6.1307E-04  2.4716E-03  1.2776E 02  7.7452E-04
  66   .6302    135.0    534.37   1.9489E 00   5.1754E-01   6.8855E-04  2.7756E-03  1.2816E 02  8.6979E-04
  67   .6722    135.0    539.26   2.4144E 00   5.8061E-01   7.7752E-04  3.1334E-03  1.2933E 02  9.8192E-04
  68   .7170    135.0    540.34   2.6767E 00   6.3334E-01   8.4534E-04  3.4065E-03  1.2958E 02  1.0675E-03
  69   .7583    135.0    537.64   1.9555E 00   5.4866E-01   7.3319E-04  2.9548E-03  1.2894E 02  9.2597E-04
  70   .7996    135.0    539.44   3.7803E 00   9.5313E-01   1.2767E-03  5.1450E-03  1.2937E 02  1.6123E-03
  71   .8409    135.0    540.80   3.9485E 00   9.2261E-01   1.2381E-03  4.9890E-03  1.2969E 02  1.5634E-03
  72   .8822    135.0    541.11   3.4729E 00   9.3957E-01   1.2614E-03  5.0827E-03  1.2977E 02  1.5928E-03
  73   .9235    135.0    543.74   3.6194E 00   8.8845E-01   1.1937E-03  4.8101E-03  1.2992E 02  1.5074E-03
  74   .9648    135.0    546.61   3.7929E 00   9.1211E-01   1.2336E-03  4.9704E-03  1.3108E 02  1.5573E-03
  75   .2524    180.0    524.15   1.7294E 00   5.1121E-01   6.7101E-04  2.7064E-03  1.2573E 02  8.4811E-04
  76   .2943    180.0    528.66   9.9442E-01   3.1915E-01   4.2141E-04  1.6993E-03  1.2680E 02  5.3250E-04
  77   .3363    180.0    530.01   1.4802E 00   4.3757E-01   5.7881E-04  2.3337E-03  1.2713E 02  7.3134E-04
  78   .3783    180.0    531.15   1.4093E 00   4.2364E-01   5.6123E-04  2.2627E-03  1.2740E 02  7.0909E-04
  79   .4203    180.0    532.96   1.5170E 00   4.4844E-01   5.9551E-04  2.4007E-03  1.2703E 02  7.5232E-04
  80   .4623    180.0    533.83   1.5244E 00   4.3531E-01   5.7961E-04  2.3369E-03  1.2805E 02  7.3215E-04
  81   .5043    180.0    536.53   1.5612E 00   3.9112E-01   5.2186E-04  2.1034E-03  1.2867E 02  6.5915E-04
  82   .5463    180.0    537.71   1.5856E 00   4.2107E-01   5.6271E-04  2.2679E-03  1.2896E 02  7.1070E-04
  83   .5882    180.0    538.91   1.4814E 00   3.9339E-01   5.2656E-04  2.1221E-03  1.2924E 02  6.6500E-04
  84   .6302    180.0    538.39  -3.8236E-02  -1.0153E-02  -1.3581E-05 -5.4735E-05  1.2912E 02 -1.7152E-05
  85   .6722    180.0    545.69   2.3178E 00   5.5734E-01   7.5291E-04  3.0331E-03  1.3086E 02  9.5051E-04
  86   .7170    180.0    547.17   2.9717E 00   6.9982E-01   9.4719E-04  3.8155E-03  1.3121E 02  1.1957E-03
  87   .7583    180.0    545.05   2.9114E 00   6.0393E-01   8.1508E-04  3.2837E-03  1.3070E 02  1.0290E-03
  88   .7996    180.0    547.02   3.3077E 00   8.6164E-01   1.1660E-03  4.6969E-03  1.3117E 02  1.4719E-03
  89   .8409    180.0    547.99   3.7127E 00   9.4863E-01   1.2854E-03  5.1778E-03  1.3141E 02  1.6225E-03
  90   .8822    180.0    548.85   4.0197E 00   9.2630E-01   1.2566E-03  5.0614E-03  1.3161E 02  1.5861E-03
  91   .9235    180.0    550.17   3.9144E 00   9.6800E-01   1.3058E-03  5.2594E-03  1.3193E 02  1.6482E-03
  92   .9648    180.0    552.49   4.1369E 00   9.5330E-01   1.3009E-03  5.2391E-03  1.3252E 02  1.6409E-03
  93   .8822    225.0    551.10   3.5710E 00   9.1257E-01   1.2419E-03  5.0016E-03  1.3217E 02  1.5674E-0
  94   .9648    225.0    553.54   3.6300E 00   8.7501E-01   1.1946E-03  4.8105E-03  1.3273E 02  1.5075E-03
  95   .7170    270.0    550.91   2.7419E 00   6.1068E-01   8.4082E-04  3.3863E-03  1.3210E 02  1.0612E-03
  96   .7996    270.0    552.08   3.1651E 00   8.4050E-01   1.1452E-03  4.6120E-03  1.3238E 02  1.4453E-03
  97   .8822    270.0    554.45   3.5731E 00   9.1296E-01   1.2483E-03  5.0264E-03  1.3299E 02  1.5751E-03
  98   .9648    270.0    554.15   3.6008E 00   8.6779E-01   1.1858E-03  4.7747E-03  1.3287E 02  1.4963E-03
```


GE ASYMMETRIC TRIP TEST
HEAT TRANSFER PHASE
GROUP 35
RE NO = 1.31 X 10**6
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.88
32.00
24.00
16.00
8.00
0.20
0.40
0.60
X/L

2

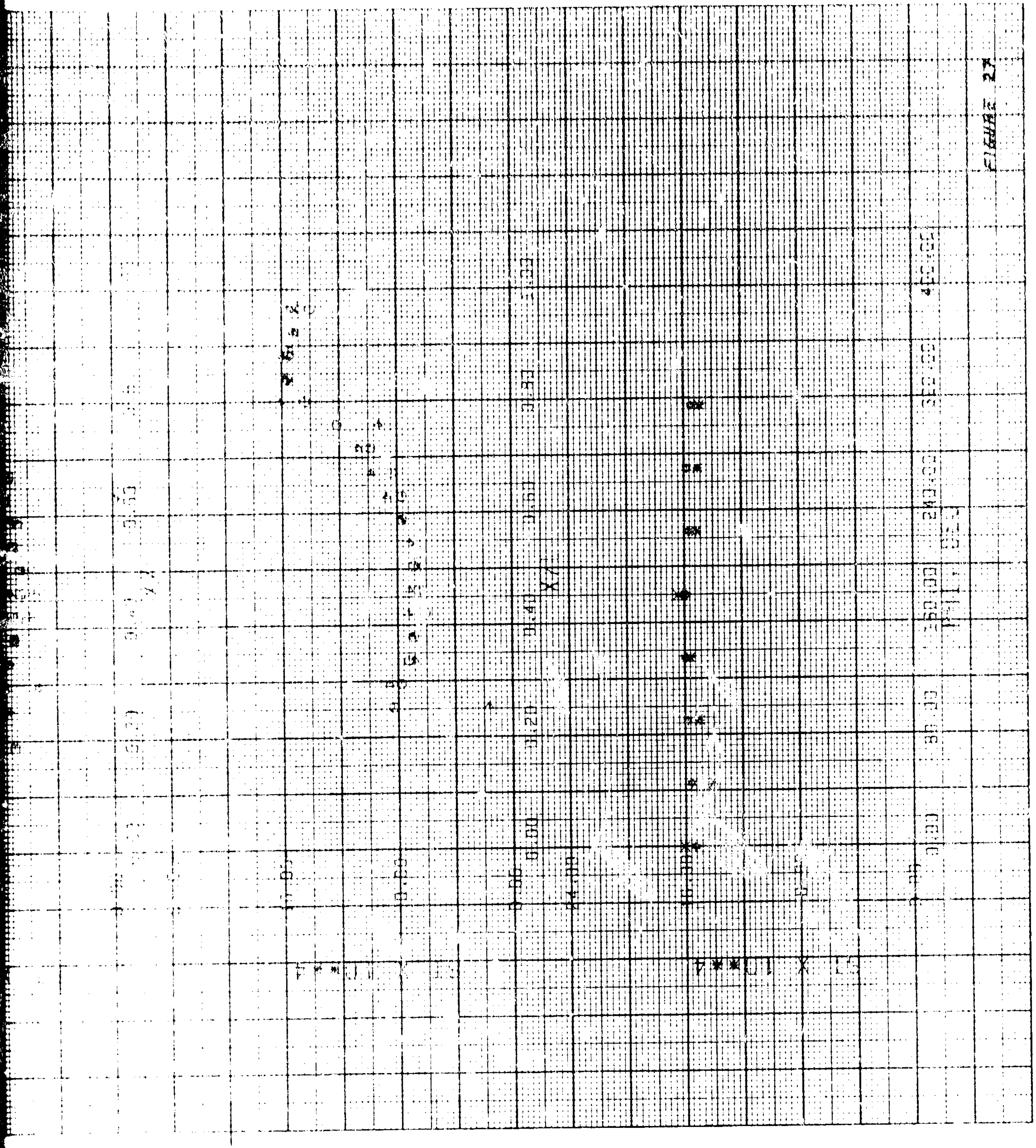


FIGURE 27
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
X7
0.00
0.20
0.40
0.60
0.80
1.00
X 10**4

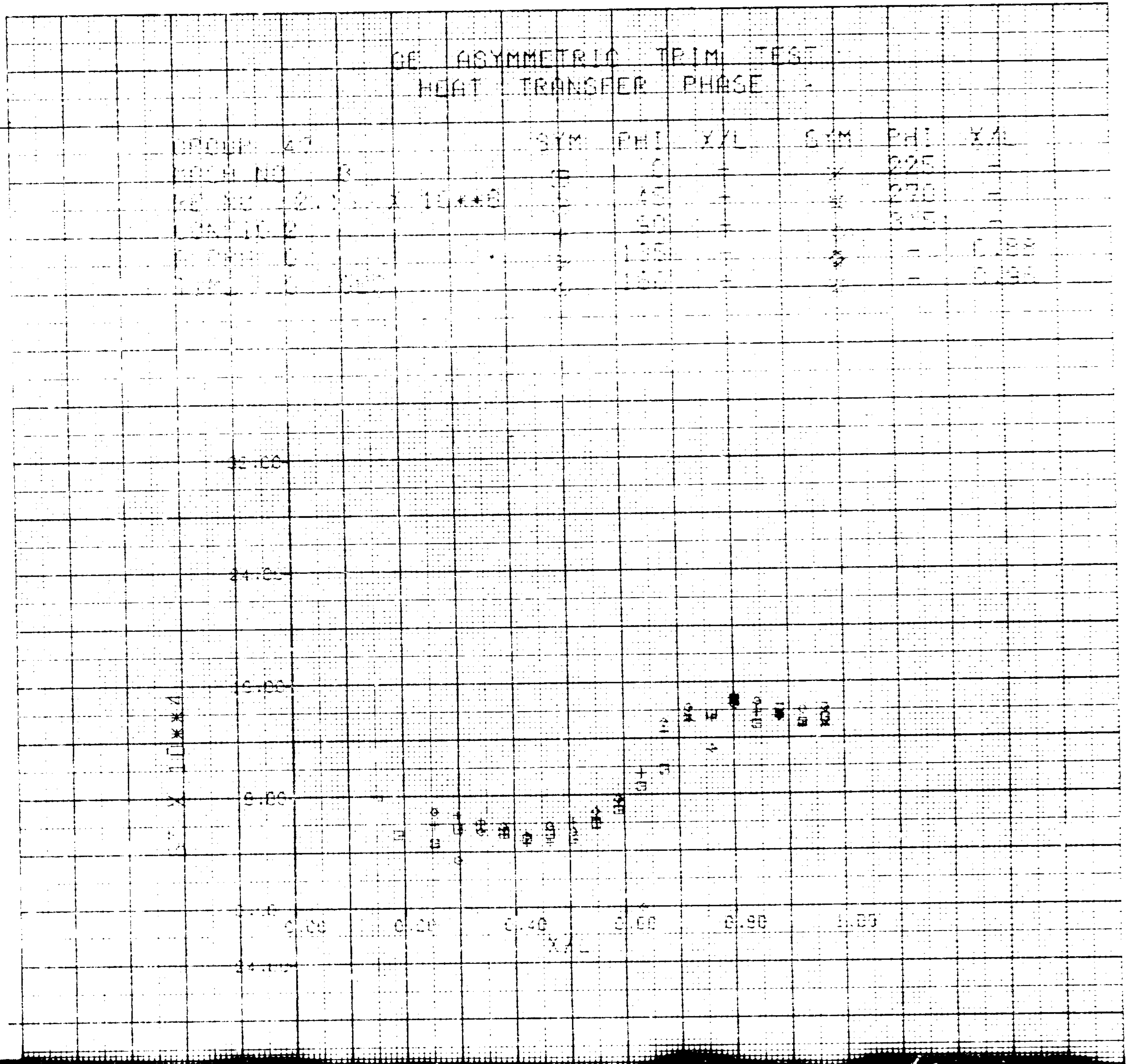
Figure 27

```
                                   7/14/69

                      ARO, INC., ARNOLD AFS, TENNESSEE
                      VON KARMAN GAS DYNAMICS FACILITY
                        50 INCH HYPERSONIC TUNNEL B
                                VT0947-000
GROUP   CONFIG    ALPHA-M      BETA-M      ALPHA-S    ROLL   ALP-P   DATE     MACH NO        PO          TO          TIME
 47        E         -.01          0          .01        5       0    719       7.99        669.07      1364.05       -.00
   T-INF        P-INF        Q-INF        V-INF       RHO-INF       MU-INF       RE/FT         RE/D          MD
 9.0773E 01  4.3531E-02  2.1687E 00  3.8114E 03  4.2962E-05  7.9302E-09  2.1460E 06  1.9671E 06  3.1969E 02

TC NO    X/L     PHI     TEMP      SLOPE        Q-STDW        HT           HH           HW          ST

   1   .1990       0    548.53  1.5906E 00  7.8177E-01  1.0228E-03  4.1175E-03  1.2965E 02  7.8159E-04
   2   .1687       0    536.78  2.4435E 00  5.3662E-01  6.9866E-04  2.8131E-03  1.2873E 02  5.3394E-04
   3   .2524       0    537.15  1.5947E 00  4.7141E-01  6.1906E-04  2.4729E-03  1.2882E 02  4.6928E-04
   4   .2943       0    541.22  1.8691E 00  5.7899E-01  7.4774E-04  3.0160E-03  1.2979E 02  5.7131E-04
   5   .3363       0    542.06  1.8822E 00  5.9607E-01  7.7802E-04  3.1349E-03  1.2999E 02  5.9502E-04
   6   .3783       0    542.39  1.7789E 00  5.1673E-01  7.0132E-04  2.8229E-03  1.3007E 02  5.3582E-04
   7   .4203       0    541.97  1.7227E 00  5.0054E-01  6.5912E-04  2.6510E-03  1.2997E 02  5.0129E-04
   8   .4623       0    542.35  1.9235E 00  5.2997E-01  6.9505E-04  2.7977E-03  1.3006E 02  5.3182E-04
   9   .5043       0    542.68  1.8256E 00  4.9390E-01  6.4752E-04  2.6065E-03  1.3000E 02  4.9471E-04
  10   .5463       0    543.37  2.1500E 00  6.0325E-01  7.9220E-04  3.1886E-03  1.3030E 02  6.0522E-04
  11   .5882       0    544.32  2.5290E 00  6.9703E-01  9.1650E-04  3.6887E-03  1.3053E 02  7.0014E-04
  12   .6302       0    545.96  3.1925E 00  8.6100E-01  1.1346E-03  4.5659E-03  1.3092E 02  8.6664E-04
  13   .6722       0    545.97  3.9138E 00  9.8049E-01  1.2920E-03  5.1996E-03  1.3092E 02  9.8692E-04
  99   .8822   315.0    550.66  5.0866E 00  1.3251E 00  1.7569E-03  7.0680E-03  1.3204E 02  1.3417E-03
  15   .7583       0    549.00  5.4518E 00  1.3590E 00  1.7979E-03  7.2343E-03  1.3165E 02  1.3731E-03
  16   .7996       0    549.17  5.2242E 00  1.4669E 00  1.9411E-03  7.0109E-03  1.3167E 02  1.4825E-03
  17   .8409       0    549.02  5.0498E 00  1.2903E 00  1.7071E-03  6.8680E-03  1.3165E 02  1.3030E-03
  18   .8822       0    550.27  5.4380E 00  1.3874E 00  1.8386E-03  7.3976E-03  1.3195E 02  1.4041E-03
  19   .9235       0    550.75  5.1761E 00  1.2967E 00  1.7187E-03  6.9149E-03  1.3197E 02  1.3125E-03
  20   .9648       0    548.76  5.5608E 00  1.3373E 00  1.7687E-03  7.1167E-03  1.3159E 02  1.3508E-03
  21   .2524    45.0    535.49  2.2632E 00  6.6904E-01  8.6960E-04  3.5016E-03  1.2843E 02  6.6463E-04
  22   .2943    45.0    539.82  1.8977E 00  6.0832E-01  7.9517E-04  3.2011E-03  1.2946E 02  6.0760E-04
  23   .3363    45.0    541.37  1.8991E 00  5.7086E-01  7.4771E-04  3.0098E-03  1.2983E 02  5.7129E-04
  24   .3783    45.0    542.91  1.6592E 00  4.9877E-01  6.5460E-04  2.6348E-03  1.3020E 02  5.0011E-04
  25   .4203    45.0    543.31  1.7249E 00  5.0117E-01  6.5810E-04  2.6488E-03  1.3029E 02  5.0277E-04
  26   .4623    45.0    545.44  1.7366E 00  4.8725E-01  6.4162E-04  2.5822E-03  1.3080E 02  4.9012E-04
  27   .5043    45.0    546.26  2.0834E 00  5.3200E-01  7.0130E-04  2.8223E-03  1.3099E 02  5.3569E-04
 100   .9648   315.0    552.77  5.1662E 00  1.2424E 00  1.6519E-03  6.6454E-03  1.3254E 02  1.2616E-03
  29   .5882    45.0    547.65  2.7359E 00  7.5302E-01  9.9554E-04  4.0061E-03  1.3132E 02  7.6538E-04
  30   .6302    45.0    549.44  3.3342E 00  9.0204E-01  1.1941E-03  4.8047E-03  1.3175E 02  9.1196E-04
  31   .6722    45.0    550.36  4.8011E 00  1.1785E 00  1.5620E-03  6.2846E-03  1.3197E 02  1.1929E-03
  32   .7170    45.0    551.82  5.7483E 00  1.3537E 00  1.7976E-03  7.2320E-03  1.3232E 02  1.3727E-0
  33   .7583    45.0    552.67  5.0539E 00  1.3925E 00  1.8513E-03  7.4475E-03  1.3252E 02  1.4136E-03
  34   .7996    45.0    553.02  5.1459E 00  1.4438E 00  1.9206E-03  7.7246E-03  1.3260E 02  1.4664E-03
  35   .8409    45.0    554.36  5.0138E 00  1.3564E 00  1.8073E-03  7.2701E-03  1.3292E 02  1.3799E-03
  36   .8822    45.0    555.12  5.1127E 00  1.3448E 00  1.7937E-03  7.2148E-03  1.3310E 02  1.3694E-03
  37   .9235    45.0    555.14  4.9485E 00  1.2644E 00  1.6865E-03  6.7830E-03  1.3311E 02  1.2876E-03
  38   .9648    45.0    552.97  4.9195E 00  1.1830E 00  1.5735E-03  6.3298E-03  1.3259E 02  1.2016E-03
  39   .2524    90.0    540.39  2.4217E 00  5.9763E-01  7.8178E-04  3.1471E-03  1.2960E 02  5.9735E-04
  40   .2943    90.0    544.59  2.0826E 00  6.6771E-01  8.7827E-04  3.5347E-03  1.3059E 02  6.7092E-04
  41   .3363    90.0    545.41  1.4924E 00  5.9729E-01  7.8648E-04  3.1652E-03  1.3079E 02  6.0076E-04
  42   .3783    90.0    545.83  1.6935E 00  5.3452E-01  7.0422E-04  2.8341E-03  1.3089E 02  5.3793E-04
  43   .4203    90.0    546.46  1.5476E 00  4.5749E-01  6.0324E-04  2.4276E-03  1.3104E 02  4.6078E-04
  44   .4623    90.0    546.10  1.5839E 00  4.6717E-01  6.1571E-04  2.4778E-03  1.3095E 02  4.7031E-04
  45   .5043    90.0    547.82  2.1733E 00  5.9881E-01  7.9101E-04  3.1830E-03  1.3136E 02  6.0416E-04
  46   .5463    90.0    547.83  2.1537E 00  6.1505E-01  8.1246E-04  3.2693E-03  1.3137E 02  6.2054E-04
  47   .5882    90.0    549.29  2.5594E 00  7.1811E-01  9.5043E-04  3.8242E-03  1.3171E 02  7.2586E-04
  48   .6302    90.0    550.58  3.4403E 00  9.4791E-01  1.2567E-03  5.0563E-03  1.3202E 02  9.5973E-04
  49   .6722    90.0    550.19  4.4631E 00  1.2384E 00  1.6409E-03  6.6023E-03  1.3193E 02  1.2532E-03
  50   .7170    90.0    552.18  5.5790E 00  1.3138E 00  1.7455E-03  7.0222E-03  1.3240E 02  1.3329E-03
  51   .7583    90.0    571.21  4.9885E 00  1.2995E 00  1.7713E-03  7.1186E-03  1.3695E 02  1.3512E-03
  52   .7996    90.0    552.27  5.7010E 00  1.4851E 00  1.9734E-03  7.9389E-03  1.3243E 02  1.5069E-03
  53   .8409    90.0    552.03  5.4615E 00  1.3602E 00  1.8175E-03  7.3117E-03  1.3237E 02  1.3878E-03
  54   .8822    90.0    553.15  5.4373E 00  1.3347E 00  1.7756E-03  7.1427E-03  1.3263E 02  1.3557E-03
  55   .9235    90.0    552.90  5.3152E 00  1.2782E 00  1.6994E-03  6.8383E-03  1.3257E 02  1.2980E-03
  56   .9648    90.0    549.85  5.3112E 00  1.2772E 00  1.6917E-03  6.8066E-03  1.3185E 02  1.2920E-03
  57   .2524   135.0    535.43  5.3384E-01  1.5701E-01  2.0515E-04  8.2608E-04  1.2846E 02  1.5680E-04
  58   .2943   135.0    539.96  1.9573E 00  6.2756E-01  8.2046E-04  3.3029E-03  1.2949E 02  6.2692E-04
  59   .3363   135.0    540.47  1.8954E 00  5.9823E-01  7.8264E-04  3.1506E-03  1.2961E 02  5.9800E-04
  60   .3783   135.0    539.07  1.7419E 00  5.4111E-01  7.0656E-04  2.8445E-03  1.2927E 02  5.3492E-04
  61   .4203   135.0    540.78  1.8847E 00  5.6654E-01  7.4148E-04  2.9848E-03  1.2969E 02  5.6654E-04
  62   .4623   135.0    541.19  1.7501E 00  5.0851E-01  6.6589E-04  2.6805E-03  1.2978E 02  5.0877E-04
  63   .5043   135.0    541.85  2.1772E 00  5.5630E-01  7.2909E-04  2.9348E-03  1.2994E 02  5.5705E-04
  64   .5463   135.0    542.42  2.5001E 00  6.6391E-01  8.7078E-04  3.5050E-03  1.3008E 02  6.6528E-04
  65   .5882   135.0    543.58  2.9430E 00  7.9499E-01  1.0443E-03  4.2032E-03  1.3035E 02  7.9780E-04
  66   .6302   135.0    544.47  3.8560E 00  1.0240E 00  1.3467E-03  5.4199E-03  1.3057E 02  1.0287E-03
  67   .6722   135.0    545.89  5.2914E 00  1.2725E 00  1.6766E-03  6.7473E-03  1.3091E 02  1.2807E-03
  68   .7170   135.0    546.74  5.4150E 00  1.3929E 00  1.8375E-03  7.3943E-03  1.3112E 02  1.4035E-03
  69   .7583   135.0    543.32  3.7663E 00  1.0568E 00  1.3877E-03  5.5853E-03  1.3029E 02  1.0601E-03
  70   .7996   135.0    546.49  5.3892E 00  1.5659E 00  2.0648E-03  8.3094E-03  1.3105E 02  1.5772E-03
  71   .8409   135.0    546.87  5.0190E 00  1.3829E 00  1.8244E-03  7.3419E-03  1.3114E 02  1.3935E-03
  72   .8822   135.0    547.28  5.0755E 00  1.3731E 00  1.8125E-03  7.2937E-03  1.3123E 02  1.3844E-03
  73   .9235   135.0    548.05  5.3784E 00  1.2957E 00  1.7121E-03  6.8893E-03  1.3142E 02  1.3076E-03
  74   .9648   135.0    546.66  5.5540E 00  1.3358E 00  1.7618E-03  7.0900E-03  1.3109E 02  1.3457E-03
  75   .2524   180.0    537.16  2.4000E 00  6.9736E-01  9.0839E-04  3.6574E-03  1.2883E 02  6.9421E-04
  76   .2943   180.0    542.10  1.0763E 00  3.4510E-01  4.5244E-04  1.8212E-03  1.3000E 02  3.4567E-04
  77   .3363   180.0    542.69  1.8630E 00  5.5072E-01  7.2258E-04  2.9085E-03  1.3014E 02  5.5205E-04
  78   .3783   180.0    542.96  1.9297E 00  5.8008E-01  7.6137E-04  3.0645E-03  1.3021E 02  5.8167E-04
  79   .4203   180.0    544.56  1.7467E 00  5.1634E-01  6.7914E-04  2.7333E-03  1.3059E 02  5.1882E-04
  80   .4623   180.0    545.37  2.0378E 00  5.8194E-01  7.6624E-04  3.0837E-03  1.3078E 02  5.8532E-04
  81   .5043   180.0    545.70  2.1587E 00  5.4079E-01  7.1236E-04  2.8668E-03  1.3086E 02  5.4415E-04
  82   .5463   180.0    546.27  2.5765E 00  6.8420E-01  9.0195E-04  3.6297E-03  1.3099E 02  6.8895E-04
  83   .5882   180.0    546.78  2.9078E 00  7.7218E-01  1.0186E-03  4.0991E-03  1.3112E 02  7.7804E-04
  84   .6302   180.0    538.29 -1.0428E-02 -2.7692E-03 -3.6126E-06 -1.4544E-05  1.2910E 02 -2.7606E-06
  85   .6722   180.0    551.27  5.4139E 00  1.3019E 00  1.7277E-03  6.9509E-03  1.3219E 02  1.3193E-03
  86   .7170   180.0    552.70  5.9431E 00  1.3995E 00  1.8607E-03  7.4855E-03  1.3253E 02  1.4208E-03
  87   .7583   180.0    549.55  4.6545E 00  1.1193E 00  1.4820E-03  5.9628E-03  1.3178E 02  1.1318E-03
  88   .7996   180.0    551.41  5.4382E 00  1.4167E 00  1.8803E-03  7.5646E-03  1.3222E 02  1.4358E-03
  89   .8409   180.0    551.75  5.6340E 00  1.4395E 00  1.9115E-03  7.6901E-03  1.3230E 02  1.4596E-03
  90   .8822   180.0    551.97  5.8287E 00  1.3432E 00  1.7840E-03  7.1772E-03  1.3235E 02  1.3623E-03
  91   .9235   180.0    552.53  5.6333E 00  1.3828E 00  1.8378E-03  7.3934E-03  1.3246E 02  1.4033E-03
  92   .9648   180.0    552.37  6.0520E 00  1.3946E 00  1.8534E-03  7.4561E-03  1.3245E 02  1.4152E-03
  93   .8822   225.0    552.72  5.1676E 00  1.3204E 00  1.7555E-03  7.0673E-03  1.3253E 02  1.3405E-03
  94   .9648   225.0    552.12  5.1636E 00  1.2417E 00  1.6497E-03  6.6366E-03  1.3239E 02  1.2597E-03
  95   .7170   270.0    555.16  5.0024E 00  1.3307E 00  1.7750E-03  7.1397E-03  1.3311E 02  1.3552E-03
  96   .7996   270.0    555.85  5.4677E 00  1.4519E 00  1.9385E-03  7.7971E-03  1.3328E 02  1.4790E-03
  97   .8822   270.0    554.81  5.1155E 00  1.3582E 00  1.8108E-03  7.2838E-03  1.3303E 02  1.3825E-03
  98   .9648   270.0    553.04  5.3483E 00  1.2861E 00  1.7107E-03  6.8820E-03  1.3261E 02  1.3061E-03
```

GE ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

GROUP 47


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 47
X 10**6
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.94
32.00
24.00
16.00
8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L

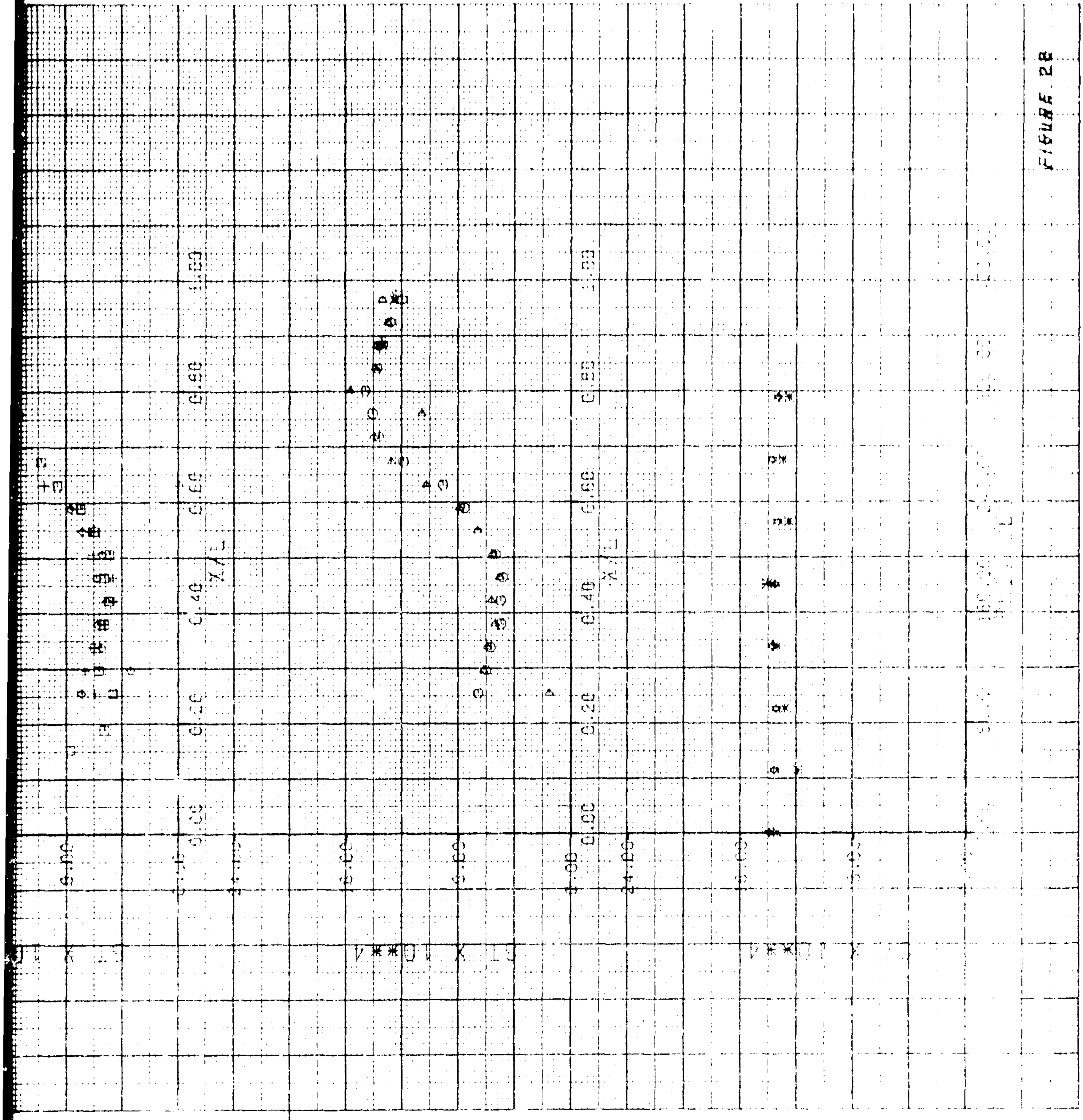
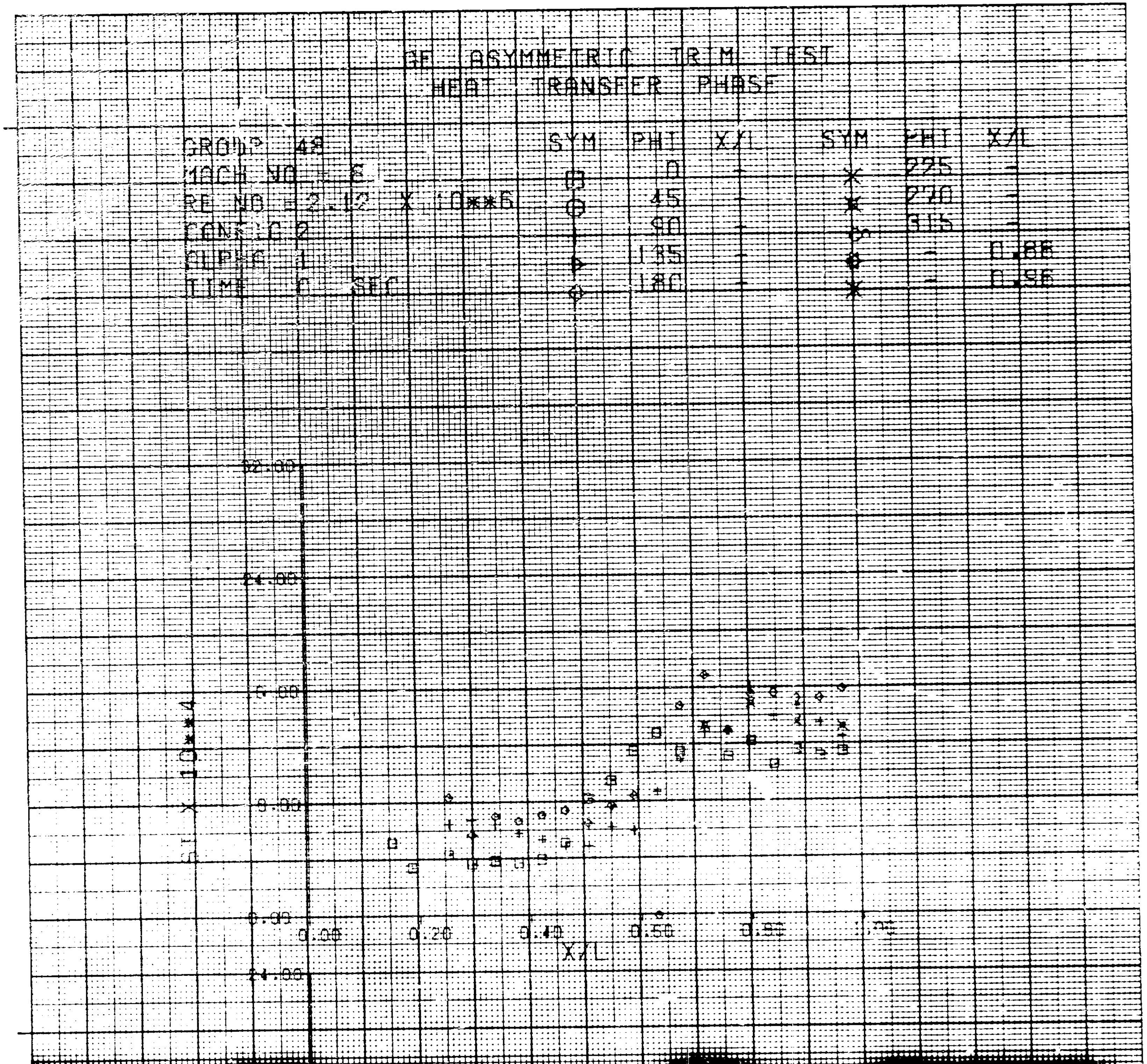

0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
8.00
16.00
24.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
8.00
16.00
24.00
160.00
FIGURE 28

Figure 28

```
                                   7/16/69

                   AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                     VON KARMAN GAS DYNAMICS FACILITY
                       50 INCH HYPERSONIC TUNNEL B
                               VT0647-000
GROUP  CONFIG    ALPHA-M      BETA-M     ALPHA-S     ROLL   ALP-P   DATE    MACH NO      PO        TO        TIME
  48      2        1.01          0         1.01        0       0     715      7.99      470.67   1317.04     -.00
  T-INF       P-INF       Q-INF       V-INF       RHO-INF      MU-INF      RE/FT       HE/N        HW
9.5659E 01  4.8541E-02  2.1692E 00  3.8291E 03  4.2574E-05  7.7015E-08  2.1167E 06  1.9402E 04  3.2205E 02

TC NO   X/L     PHI    TEMP     SLOPE        Q-STDH        HT           HH           HW          ST

  1    .1900     0    530.88  2.6989E 00  5.3233E-01  6.7718E-04  2.7255E-03  1.2773E 02  5.1962E-04
  2    .1467     0    531.66  1.6181E 00  3.5360E-01  4.5023E-04  1.8121E-03  1.2752E 02  3.4540E-04
  3    .2524     0    533.15  1.6790E 00  4.1721E-01  5.5774E-04  2.2449E-03  1.2767E 02  4.2795E-04
  4    .2943     0    534.71  1.1925E 00  3.7660E-01  4.8114E-04  1.9362E-03  1.2825E 02  3.6914E-04
  5    .3363     0    535.90  1.2662E 00  3.9335E-01  5.0356E-04  2.0243E-03  1.2853E 02  3.8632E-04
  6    .3783     0    536.98  1.2581E 00  3.7819E-01  4.8483E-04  1.9508E-03  1.2878E 02  3.7192E-04
  7    .4203     0    537.32  1.1796E 00  4.0860E-01  5.1618E-04  2.0686E-03  1.2866E 02  3.9437E-04
  8    .4623     0    538.06  1.8960E 00  5.2104E-01  6.7044E-04  2.6978E-03  1.2919E 02  5.1426E-04
  9    .5043     0    539.17  3.0817E 00  8.3373E-01  1.0718E-03  4.3171E-03  1.2930E 02  8.2210E-04
 10    .5463     0    541.59  3.6136E 00  9.5779E-01  1.2391E-03  4.9868E-03  1.2987E 02  9.4722E-04
 11    .5882     0    543.34  4.2330E 00  1.1605E 00  1.5017E-03  6.0640E-03  1.3030E 02  1.1562E-03
 12    .6302     0    545.27  4.7615E 00  1.2882E 00  1.6691E-03  6.7129E-03  1.3076E 02  1.2798E-03
 13    .6722     0    547.08  4.4998E 00  1.1524E 00  1.4969E-03  6.0181E-03  1.3117E 02  1.1474E-03
 99    .8822   315.0  552.71  4.7706E 00  1.2428E 00  1.6260E-03  6.5369E-03  1.3253E 02  1.2463E-03
 15    .7583     0    549.75  4.6391E 00  1.1150E 00  1.4540E-03  5.8462E-03  1.3182E 02  1.1146E-03
 16    .7996     0    550.38  4.3494E 00  1.2205E 00  1.5920E-03  6.4008E-03  1.3197E 02  1.2203E-03
 17    .8409     0    550.09  4.1260E 00  1.0542E 00  1.3744E-03  5.5270E-03  1.3191E 02  1.0537E-03
 18    .8822     0    550.14  4.6255E 00  1.1508E 00  1.5118E-03  6.0754E-03  1.3192E 02  1.1582E-03
 19    .9235     0    549.08  4.4544E 00  1.1159E 00  1.4531E-03  5.8426E-03  1.3166E 02  1.1139E-03
 20    .9648     0    549.17  4.7742E 00  1.1481E 00  1.4952E-03  6.0172E-03  1.3169E 02  1.1462E-03
 21    .2524    45.0  531.63  2.0255E 00  5.9875E-01  7.6234E-04  3.0683E-03  1.2751E 02  5.8490E-04
 22    .2943    45.0  533.53  1.9395E 00  5.8978E-01  7.5274E-04  3.0294E-03  1.2796E 02  5.7755E-04
 23    .3363    45.0  535.09  1.6984E 00  5.1055E-01  6.5292E-04  2.6274E-03  1.2833E 02  5.0092E-04
 24    .3783    45.0  536.13  1.8493E 00  5.0779E-01  6.5026E-04  2.6165E-03  1.2858E 02  4.9885E-04
 25    .4203    45.0  537.70  1.4523E 00  4.2197E-01  5.4151E-04  2.1782E-03  1.2898E 02  4.1530E-04
 26    .4623    45.0  540.46  1.6513E 00  4.6333E-01  5.9663E-04  2.4002E-03  1.2961E 02  4.5760E-04
 27    .5043    45.0  541.57  1.8167E 00  4.8243E-01  6.2211E-04  2.5025E-03  1.2987E 02  4.7712E-04
100    .9648   315.0  553.36  4.8993E 00  1.1702E 00  1.5427E-03  6.2019E-03  1.3268E 02  1.1826E-03
 29    .5882    45.0  544.32  2.7573E 00  6.2195E-01  8.0489E-04  3.2373E-03  1.3053E 02  6.1728E-04
 30    .6302    45.0  546.25  3.0010E 00  8.1189E-01  1.0533E-03  4.2361E-03  1.3099E 02  8.0762E-04
 31    .6722    45.0  550.04  4.5516E 00  1.0436E 00  1.3607E-03  5.4716E-03  1.3189E 02  1.0431E-03
 32    .7170    45.0  552.19  4.1022E 00  1.2015E 00  1.5709E-03  6.3157E-03  1.3241E 02  1.2041E-03
 33    .7583    45.0  552.04  5.0186E 00  1.3828E 00  1.8075E-03  7.2670E-03  1.3237E 02  1.3855E-03
 34    .7996    45.0  552.80  4.8442E 00  1.3592E 00  1.7785E-03  7.1500E-03  1.3255E 02  1.3632E-03
 35    .8409    45.0  553.52  4.8326E 00  1.3073E 00  1.7122E-03  6.8830E-03  1.3272E 02  1.3123E-03
 36    .8822    45.0  552.95  4.8451E 00  1.2746E 00  1.6678E-03  6.7050E-03  1.3259E 02  1.2783E-03
 37    .9235    45.0  551.89  4.7499E 00  1.2136E 00  1.5862E-03  6.3770E-03  1.3233E 02  1.2158E-03
 38    .9648    45.0  552.01  4.8108E 00  1.1088E 00  1.4509E-03  5.8329E-03  1.3255E 02  1.1121E-03
 39    .2524    90.0  535.14  2.7176E 00  6.5548E-01  8.3832E-04  3.3735E-03  1.2834E 02  6.4316E-04
 40    .2943    90.0  537.36  2.1284E 00  6.8241E-01  8.7525E-04  3.5216E-03  1.2887E 02  6.7141E-04
 41    .3363    90.0  538.30  2.8612E 00  6.5059E-01  8.3543E-04  3.3613E-03  1.2910E 02  6.4085E-04
 42    .3783    90.0  539.73  1.8638E 00  5.8824E-01  7.5682E-04  3.0447E-03  1.2944E 02  5.8049E-04
 43    .4203    90.0  541.77  1.8410E 00  5.4423E-01  7.0198E-04  2.8238E-03  1.2992E 02  5.3837E-04
 44    .4623    90.0  540.93  1.8745E 00  4.8912E-01  6.3021E-04  2.5352E-03  1.2972E 02  4.8339E-04
 45    .5043    90.0  542.65  1.7937E 00  4.9421E-01  6.3819E-04  2.5671E-03  1.3013E 02  4.8942E-04
 46    .5463    90.0  544.93  2.1756E 00  6.2127E-01  8.0465E-04  3.2362E-03  1.3068E 02  6.1699E-04
 47    .5882    90.0  545.62  2.1228E 00  5.9562E-01  7.7212E-04  3.1053E-03  1.3084E 02  5.9203E-04
 48    .6302    90.0  546.90  3.1574E 00  8.7008E-01  1.1298E-03  4.5434E-03  1.3115E 02  8.6620E-04
 49    .6722    90.0  550.84  4.3837E 00  1.0982E 00  1.4318E-03  5.7571E-03  1.3199E 02  1.0976E-03
 50    .7170    90.0  552.19  5.4468E 00  1.2827E 00  1.6770E-03  6.7422E-03  1.3241E 02  1.2856E-03
 51    .7583    90.0  549.85  4.9866E 00  1.2940E 00  1.6931E-03  6.8078E-03  1.3185E 02  1.2979E-03
 52    .7996    90.0  551.55  6.1326E 00  1.5975E 00  2.0869E-03  8.3906E-03  1.3225E 02  1.5997E-03
 53    .8409    90.0  550.54  5.5724E 00  1.3960E 00  1.8213E-03  7.3228E-03  1.3201E 02  1.3961E-03
 54    .8822    90.0  550.42  5.9427E 00  1.4686E 00  1.9156E-03  7.7023E-03  1.3198E 02  1.4685E-03
 55    .9235    90.0  549.10  5.4240E 00  1.3525E 00  1.7612E-03  7.0816E-03  1.3167E 02  1.3501E-03
 56    .9648    90.0  549.31  5.2251E 00  1.2565E 00  1.6367E-03  6.5811E-03  1.3172E 02  1.2547E-03
 57    .2524   135.0  530.72  5.9320E-01  1.7240E-01  2.1925E-04  8.8250E-04  1.2729E 02  1.6825E-04
 58    .2943   135.0  533.21  2.3779E 00  7.6242E-01  9.7269E-04  3.9148E-03  1.2789E 02  7.4632E-04
 59    .3363   135.0  533.67  2.2460E 00  7.0891E-01  9.0494E-04  3.6418E-03  1.2799E 02  6.9433E-04
 60    .3783   135.0  532.89  2.1645E 00  6.7234E-01  8.5747E-04  3.4510E-03  1.2781E 02  6.5793E-04
 61    .4203   135.0  535.19  2.1418E 00  6.4362E-01  8.2345E-04  3.3136E-03  1.2835E 02  6.3174E-04
 62    .4623   135.0  536.31  2.7122E 00  6.4278E-01  8.2331E-04  3.3129E-03  1.2862E 02  6.3160E-04
 63    .5043   135.0  537.74  2.4722E 00  6.3168E-01  8.1057E-04  3.2613E-03  1.2896E 02  6.2178E-04
 64    .5463   135.0  538.91  2.7497E 00  7.3017E-01  9.3836E-04  3.7753E-03  1.2924E 02  7.1974E-04
 65    .5882   135.0  540.65  3.2770E 00  8.7043E-01  1.1211E-03  4.5101E-03  1.2966E 02  8.5907E-04
 66    .6302   135.0  542.20  3.9847E 00  1.0581E 00  1.3656E-03  5.4932E-03  1.3003E 02  1.0473E-03
 67    .6722   135.0  547.14  5.4036E 00  1.3475E 00  1.7503E-03  7.0387E-03  1.3120E 02  1.3419E-03
 68    .7170   135.0  548.31  6.2960E 00  1.4826E 00  1.9287E-03  7.7557E-03  1.3148E 02  1.4786E-03
 69    .7583   135.0  544.70  3.4879E 00  9.7865E-01  1.2671E-03  5.0963E-03  1.3062E 02  9.7162E-04
 70    .7996   135.0  548.29  5.7363E 00  1.6667E 00  2.1681E-03  8.7184E-03  1.3148E 02  1.6622E-03
 71    .8409   135.0  548.03  5.1417E 00  1.4167E 00  1.8422E-03  7.4080E-03  1.3141E 02  1.4124E-03
 72    .8822   135.0  547.90  5.5626E 00  1.5049E 00  1.9566E-03  7.8682E-03  1.3138E 02  1.5001E-03
 73    .9235   135.0  547.37  5.4156E 00  1.4275E 00  1.8548E-03  7.4587E-03  1.3126E 02  1.4220E-03
 74    .9648   135.0  549.38  5.1017E 00  1.4673E 00  1.9114E-03  7.6898E-03  1.3174E 02  1.4653E-03
 75    .2524   180.0  532.45  2.9255E 00  8.5004E-01  1.0850E-03  4.3684E-03  1.2771E 02  8.3132E-04
 76    .2943   180.0  535.92  1.8174E 00  5.8270E-01  7.4598E-04  3.0017E-03  1.2853E 02  5.7229E-04
 77    .3363   180.0  537.28  2.4127E 00  7.1323E-01  9.1467E-04  3.6803E-03  1.2885E 02  7.0165E-04
 78    .3783   180.0  538.49  2.2419E 00  6.7390E-01  8.6558E-04  3.4825E-03  1.2914E 02  6.6395E-04
 79    .4203   180.0  540.40  2.6350E 00  7.1980E-01  9.2682E-04  3.7285E-03  1.2960E 02  7.1085E-04
 80    .4623   180.0  541.34  2.6184E 00  7.4775E-01  9.6397E-04  3.8778E-03  1.2982E 02  7.3930E-04
 81    .5043   180.0  543.14  2.4952E 00  6.5015E-01  8.4009E-04  3.3791E-03  1.3028E 02  6.4424E-04
 82    .5463   180.0  544.72  2.9308E 00  7.7828E-01  1.0077E-03  4.0530E-03  1.3066E 02  7.7272E-04
 83    .5882   180.0  546.23  3.1762E 00  8.4344E-01  1.0942E-03  4.4006E-03  1.3098E 02  8.3898E-04
 84    .6302   180.0  538.08 -3.9400E-02 -1.0403E-02 -1.3432E-05 -5.4041E-05  1.2904E 02 -1.0303E-05
 85    .6722   180.0  551.67  6.1643E 00  1.4680E 00  1.9230E-03  7.7305E-03  1.3276E 02  1.4738E-03
 86    .7170   180.0  555.61  7.1203E 00  1.6764E 00  2.2021E-03  8.8517E-03  1.3322E 02  1.6876E-03
 87    .7583   180.0  551.74  5.1732E 00  1.2921E 00  1.6885E-03  6.7884E-03  1.3230E 02  1.2942E-03
 88    .7996   180.0  555.15  5.9408E 00  1.5497E 00  2.0340E-03  8.1760E-03  1.3311E 02  1.5588E-03
 89    .8409   180.0  555.19  6.0669E 00  1.5502E 00  2.0347E-03  8.1790E-03  1.3312E 02  1.5593E-03
 90    .8822   180.0  555.10  6.5623E 00  1.5122E 00  1.9847E-03  7.9778E-03  1.3310E 02  1.5210E-03
 91    .9235   180.0  556.91  6.1828E 00  1.5177E 00  1.9914E-03  8.0069E-03  1.3354E 02  1.5261E-03
 92    .9648   180.0  555.13  6.8472E 00  1.5779E 00  2.0709E-03  8.3248E-03  1.3311E 02  1.5870E-03
 93    .8822   225.0  556.19  5.7047E 00  1.4581E 00  1.9164E-03  7.7031E-03  1.3336E 02  1.4688E-03
 94    .9648   225.0  554.88  5.9208E 00  1.4234E 00  1.8682E-03  7.5096E-03  1.3305E 02  1.4317E-03
 95    .7170   270.0  557.15  5.4573E 00  1.3205E 00  1.7378E-03  6.9847E-03  1.3359E 02  1.3316E-03
 96    .7996   270.0  558.59  5.5472E 00  1.4731E 00  1.9422E-03  7.8057E-03  1.3393E 02  1.4882E-03
 97    .8822   270.0  558.49  5.7622E 00  1.3445E 00  1.7725E-03  7.1237E-03  1.3391E 02  1.3582E-03
 98    .9648   270.0  555.14  5.4642E 00  1.3140E 00  1.7247E-03  6.9327E-03  1.3311E 02  1.3217E-03
```

CF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 48 SYM PHI X/L SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 48
MACH NO = 8
RE NO = 2.12 X 10**6
CONFIG 2
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.86
- 0.96
32.00
24.00
16.00
8.00
0.00
-8.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

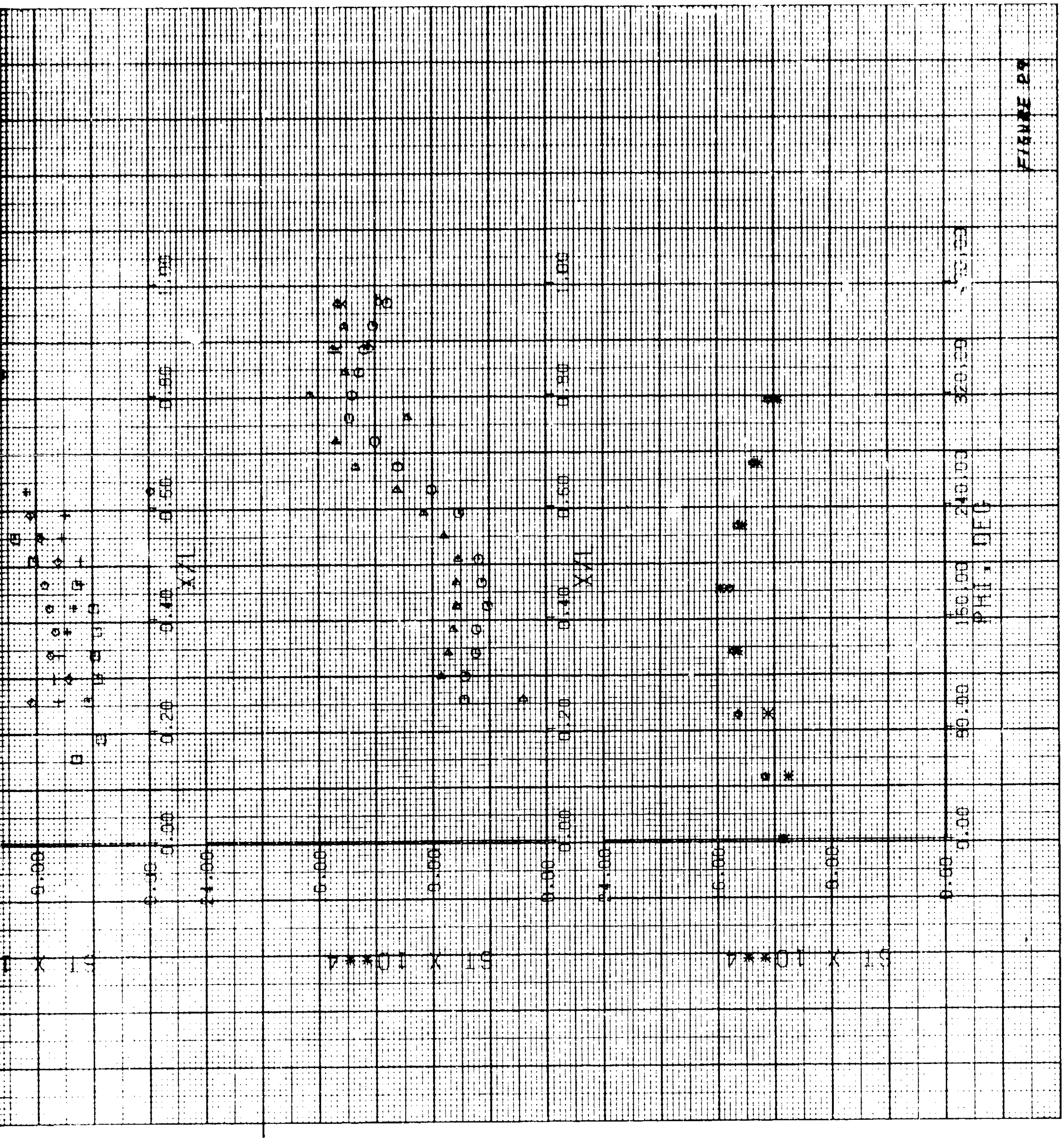


FIGURE 29
X/L
X/L
PHI, DEG
SI X 10**4
SI X 10**4
SI X 1
0.00
0.20
0.40
0.60
0.80
1.00
0.00
80.00
160.00
240.00
320.00
400.00
2.00
4.00
6.00
8.00

Figure 29

7/16/69

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0047-B00

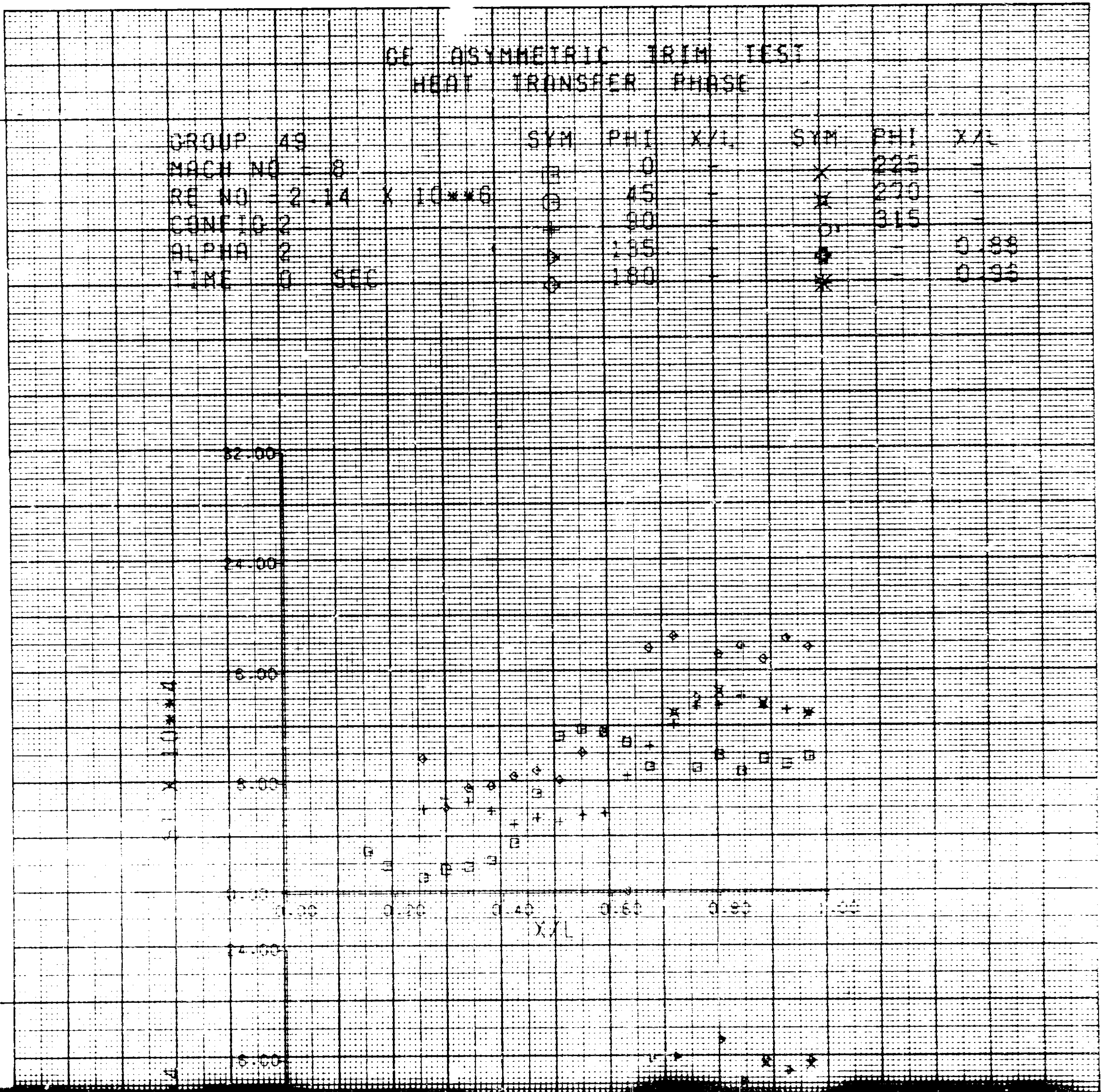
GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
49	2	2.00	0	2.00	0	0	715	7.99	669.07	1305.05	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.40531E 01	4.05207E-02	2.10434E 00	3.81303E 03	4.29175E-05	7.63040E-08	2.14209E 06	1.96404E 06	3.19001E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDY	HT	HM	HW	ST
1	.1900	0	520.12	1.8810E 00	3.1799E-01	4.0030E-04	1.0447E-03	1.2660E 02	3.1237E-04
2	.1857	0	529.48	9.4714E-01	2.0801E-01	2.6709E-04	1.0790E-03	1.2700E 02	2.0493E-04
3	.2524	0	531.12	4.1293E-01	1.2207E-01	1.5754E-04	6.3447E-04	1.2739E 02	1.2050E-04
4	.2943	0	533.01	5.6377E-01	1.7794E-01	2.3023E-04	9.2711E-04	1.2784E 02	1.7608E-04
5	.3363	0	534.35	6.2033E-01	1.9032E-01	2.5702E-04	1.0340E-03	1.2816E 02	1.9057E-04
6	.3783	0	535.86	8.4183E-01	2.4103E-01	3.1297E-04	1.2601E-03	1.2850E 02	2.3933E-04
7	.4203	0	536.59	1.2864E 00	3.7264E-01	4.8357E-04	1.9469E-03	1.2869E 02	3.6978E-04
8	.4623	0	539.06	2.4514E 00	7.3055E-01	9.5212E-04	3.4330E-03	1.2918E 02	7.2799E-04
9	.5043	0	540.07	4.2420E 00	1.1476E 00	1.4984E-03	6.0310E-03	1.2952E 02	1.1456E-03
10	.5463	0	543.42	4.3557E 00	1.1961E 00	1.5659E-03	6.3079E-03	1.3032E 02	1.1970E-03
11	.5882	0	545.71	4.2399E 00	1.1082E 00	1.5366E-03	6.1837E-03	1.3086E 02	1.1745E-03
12	.6302	0	547.69	4.0290E 00	1.0900E 00	1.4375E-03	5.7842E-03	1.3113E 02	1.0984E-03
13	.6722	0	548.54	3.6514E 00	9.1675E-01	1.2077E-03	4.8594E-03	1.3154E 02	9.2294E-04
99	.8822	315.0	554.86	3.9809E 00	1.0391E 00	1.3093E-03	5.5870E-03	1.3379E 02	1.0611E-03
15	.7583	0	553.09	3.7460E 00	9.0083E-01	1.1965E-03	4.8132E-03	1.3262E 02	9.1416E-04
16	.7996	0	554.44	3.9252E 00	9.8911E-01	1.3162E-03	5.2941E-03	1.3295E 02	1.0055E-03
17	.8409	0	554.21	3.4896E 00	8.7119E-01	1.1589E-03	4.6615E-03	1.3289E 02	8.8535E-04
18	.8822	0	554.03	3.8372E 00	9.6129E-01	1.2784E-03	5.1424E-03	1.3284E 02	9.7668E-04
19	.9235	0	552.53	3.4977E 00	9.2836E-01	1.2295E-03	4.9460E-03	1.3248E 02	9.3938E-04
20	.9648	0	551.18	4.0742E 00	9.7970E-01	1.2981E-03	5.2272E-03	1.3217E 02	9.9185E-04
21	.2524	45.0	529.76	2.1003E 00	6.2323E-01	8.0293E-04	3.2319E-03	1.2706E 02	6.1022E-04
22	.2943	45.0	531.38	1.6953E 00	5.6350E-01	7.0176E-04	2.8242E-03	1.2745E 02	5.3678E-04
23	.3363	45.0	533.03	1.5704E 00	4.7207E-01	6.1075E-04	2.4595E-03	1.2784E 02	4.6713E-04
24	.3783	45.0	535.11	1.4840E 00	4.4632E-01	5.7901E-04	2.3314E-03	1.2834E 02	4.4208E-04
25	.4203	45.0	536.15	1.3715E 00	3.6945E-01	4.7993E-04	1.9323E-03	1.2858E 02	3.6781E-04
26	.4623	45.0	539.30	1.5540E 00	4.3602E-01	5.6873E-04	2.2895E-03	1.2933E 02	4.3484E-04
27	.5043	45.0	541.21	1.8331E 00	4.8084E-01	6.3662E-04	2.5625E-03	1.2979E 02	4.8669E-04
100	.9648	315.0	556.89	4.2767E 00	1.0284E 00	1.3730E-03	5.5218E-03	1.3353E 02	1.0487E-03
29	.5882	45.0	545.44	3.1523E 00	8.6455E-01	1.1421E-03	4.5960E-03	1.3080E 02	8.7290E-04
30	.6302	45.0	548.07	4.1134E 00	1.1120E 00	1.4683E-03	5.9070E-03	1.3141E 02	1.1221E-03
31	.6722	45.0	551.82	5.5146E 00	1.2888E 00	1.6974E-03	6.8282E-03	1.3232E 02	1.2969E-03
32	.7170	45.0	553.80	5.1183E 00	1.2053E 00	1.6024E-03	6.4465E-03	1.3281E 02	1.2244E-03
33	.7583	45.0	554.55	4.4308E 00	1.2500E 00	1.6643E-03	6.6944E-03	1.3297E 02	1.2715E-03
34	.7996	45.0	555.80	4.1872E 00	1.1749E 00	1.5662E-03	6.2991E-03	1.3327E 02	1.1964E-03
35	.8409	45.0	556.44	4.2593E 00	1.1523E 00	1.5375E-03	6.1615E-03	1.3343E 02	1.1744E-03
36	.8822	45.0	556.08	4.6157E 00	1.0562E 00	1.4086E-03	5.6651E-03	1.3333E 02	1.0760E-03
37	.9235	45.0	554.45	4.8710E 00	1.0484E 00	1.3864E-03	5.5685E-03	1.3294E 02	1.0576E-03
38	.9648	45.0	554.55	3.9108E 00	9.4239E-01	1.2542E-03	5.0447E-03	1.3297E 02	9.5812E-04
39	.2524	90.0	533.75	2.0870E 00	6.1718E-01	7.9925E-04	3.2184E-03	1.2801E 02	6.1127E-04
40	.2943	90.0	534.87	2.1654E 00	6.9426E-01	9.0030E-04	3.6254E-03	1.2828E 02	6.8857E-04
41	.3363	90.0	535.94	2.1198E 00	6.6989E-01	8.6896E-04	3.4987E-03	1.2854E 02	6.6450E-04
42	.3783	90.0	537.21	1.9097E 00	6.0275E-01	7.8408E-04	3.1567E-03	1.2884E 02	5.9955E-04
43	.4203	90.0	538.68	1.7283E 00	5.1053E-01	6.6277E-04	2.6681E-03	1.2919E 02	5.0676E-04
44	.4623	90.0	538.88	1.7906E 00	5.5624E-01	7.2515E-04	2.9192E-03	1.2924E 02	5.5444E-04
45	.5043	90.0	541.32	1.9911E 00	5.2106E-01	6.8146E-04	2.7430E-03	1.2982E 02	5.2097E-04
46	.5463	90.0	542.18	1.9941E 00	5.6947E-01	7.4561E-04	3.0010E-03	1.3002E 02	5.6998E-04
47	.5882	90.0	545.00	2.0762E 00	5.8255E-01	7.6556E-04	3.0809E-03	1.3069E 02	5.8515E-04
48	.6302	90.0	547.13	3.0723E 00	8.4651E-01	1.1156E-03	4.4889E-03	1.3120E 02	8.5256E-04
49	.6722	90.0	550.38	4.3163E 00	1.0563E 00	1.3980E-03	5.6243E-03	1.3197E 02	1.0682E-03
50	.7170	90.0	553.79	5.1462E 00	1.2119E 00	1.6112E-03	6.4809E-03	1.3279E 02	1.2309E-03
51	.7583	90.0	551.52	5.1452E 00	1.3403E 00	1.7766E-03	7.1472E-03	1.3225E 02	1.3575E-03
52	.7996	90.0	553.07	5.1091E 00	1.3445E 00	1.7885E-03	7.1944E-03	1.3261E 02	1.3664E-03
53	.8409	90.0	552.77	5.6361E 00	1.4120E 00	1.8747E-03	7.5412E-03	1.3254E 02	1.4323E-03
54	.8822	90.0	552.67	5.4168E 00	1.3297E 00	1.7651E-03	7.1006E-03	1.3252E 02	1.3486E-03
55	.9235	90.0	551.33	5.4520E 00	1.3111E 00	1.7374E-03	6.9896E-03	1.3220E 02	1.3275E-03
56	.9648	90.0	551.59	5.3709E 00	1.2916E 00	1.7122E-03	6.8879E-03	1.3226E 02	1.3082E-03
57	.2524	135.0	528.55	6.2479E-01	1.8409E-01	2.3798E-04	9.5690E-04	1.2678E 02	1.8175E-04
58	.2943	135.0	530.89	2.7681E 00	8.4750E-01	1.1450E-03	4.6115E-03	1.2733E 02	8.7565E-04
59	.3363	135.0	531.16	2.6560E 00	8.3854E-01	1.0823E-03	4.3589E-03	1.2740E 02	8.2709E-04
60	.3783	135.0	530.88	2.4351E 00	7.5643E-01	9.7594E-04	3.9305E-03	1.2733E 02	7.4452E-04
61	.4203	135.0	533.53	2.4205E 00	7.2762E-01	9.4199E-04	3.7933E-03	1.2796E 02	7.2045E-04
62	.4623	135.0	535.09	2.4403E 00	7.0900E-01	9.1902E-04	3.7037E-03	1.2833E 02	7.0343E-04
63	.5043	135.0	536.93	2.7520E 00	7.0330E-01	9.1464E-04	3.6824E-03	1.2877E 02	6.9940E-04
64	.5463	135.0	538.60	3.1787E 00	8.4410E-01	1.1000E-03	4.4284E-03	1.2917E 02	8.4128E-04
65	.5882	135.0	541.71	3.6906E 00	9.8803E-01	1.2817E-03	5.1590E-03	1.2981E 02	9.7984E-04
66	.6302	135.0	543.43	4.9175E 00	1.3054E 00	1.7126E-03	6.8925E-03	1.3032E 02	1.3091E-03
67	.6722	135.0	548.97	6.5930E 00	1.5855E 00	2.0943E-03	8.4245E-03	1.3163E 02	1.6004E-03
68	.7170	135.0	551.02	6.7030E 00	1.5975E 00	2.1161E-03	8.5112E-03	1.3213E 02	1.6169E-03
69	.7583	135.0	547.60	3.8145E 00	1.0703E 00	1.4113E-03	5.6780E-03	1.3131E 02	1.0786E-03
70	.7996	135.0	552.43	5.8915E 00	1.7110E 00	2.2718E-03	9.1388E-03	1.3246E 02	1.7357E-03
71	.8409	135.0	552.59	5.1558E 00	1.4280E 00	1.8857E-03	7.5854E-03	1.3250E 02	1.4407E-03
72	.8822	135.0	552.52	5.8422E 00	1.5805E 00	2.0978E-03	8.4389E-03	1.3248E 02	1.6028E-03
73	.9235	135.0	552.37	6.8784E 00	1.4921E 00	1.9800E-03	7.9649E-03	1.3245E 02	1.5128E-03
74	.9648	135.0	551.81	6.6279E 00	1.5698E 00	2.0816E-03	8.3741E-03	1.3232E 02	1.5905E-03
75	.2524	180.0	532.47	3.4349E 00	9.9804E-01	1.2903E-03	5.1962E-03	1.2771E 02	9.8691E-04
76	.2943	180.0	534.09	1.9698E 00	6.3157E-01	8.1824E-04	3.2948E-03	1.2809E 02	6.2578E-04
77	.3363	180.0	535.44	2.6265E 00	7.7643E-01	1.0077E-03	4.0574E-03	1.2842E 02	7.7062E-04
78	.3783	180.0	536.98	2.6287E 00	7.9014E-01	1.0276E-03	4.1371E-03	1.2878E 02	7.8576E-04
79	.4203	180.0	539.66	2.8876E 00	8.5355E-01	1.1138E-03	4.4836E-03	1.2941E 02	8.5157E-04
80	.4623	180.0	541.73	3.1198E 00	8.7891E-01	1.1658E-03	4.6923E-03	1.2991E 02	8.9121E-04
81	.5043	180.0	543.65	3.2840E 00	8.2292E-01	1.0795E-03	4.3467E-03	1.3037E 02	8.2518E-04
82	.5463	180.0	545.88	3.8356E 00	1.0185E 00	1.3401E-03	5.3926E-03	1.3090E 02	1.0242E-03
83	.5882	180.0	548.36	4.3601E 00	1.1570E 00	1.5283E-03	6.1493E-03	1.3149E 02	1.1679E-03
84	.6302	180.0	538.43	4.4344E-02	1.2307E-02	1.6034E-05	6.4540E-05	1.2913E 02	1.2260E-05
85	.6722	180.0	556.64	7.3769E 00	1.7485E 00	2.3335E-03	9.3848E-03	1.3347E 02	1.7824E-03
86	.7170	180.0	559.32	7.7500E 00	1.8252E 00	2.4446E-03	9.4309E-03	1.3411E 02	1.8671E-03
87	.7583	180.0	556.98	5.7878E 00	1.3919E 00	1.8580E-03	7.4770E-03	1.3355E 02	1.4195E-03
88	.7996	180.0	561.18	6.4920E 00	1.6914E 00	2.2710E-03	9.1312E-03	1.3455E 02	1.7343E-03
89	.8409	180.0	561.90	6.8480E 00	1.7697E 00	2.3516E-03	9.4551E-03	1.3472E 02	1.7958E-03
90	.8822	180.0	561.76	7.1771E 00	1.6530E 00	2.2223E-03	8.9354E-03	1.3468E 02	1.6971E-03
91	.9235	180.0	560.67	7.4480E 00	1.8037E 00	2.4195E-03	9.7249E-03	1.3438E 02	1.8478E-03
92	.9648	180.0	559.41	7.8780E 00	1.7464E 00	2.3394E-03	9.4071E-03	1.3413E 02	1.7867E-03
93	.8822	225.0	563.09	5.9554E 00	1.5217E 00	2.0506E-03	8.2437E-03	1.3520E 02	1.5657E-03
94	.9648	225.0	559.13	6.3072E 00	1.5108E 00	2.0310E-03	8.1670E-03	1.3406E 02	1.5511E-03
95	.7170	270.0	548.28	5.6641E 00	1.2770E 00	1.7125E-03	6.8860E-03	1.3134E 02	1.3079E-03
96	.7996	270.0	565.48	5.3545E 00	1.4219E 00	1.9200E-03	7.7143E-03	1.3556E 02	1.4659E-03
97	.8822	270.0	566.48	5.7264E 00	1.3556E 00	1.8818E-03	7.2403E-03	1.3534E 02	1.3751E-03
98	.9648	270.0	558.79	5.7984E 00	1.2742E 00	1.7053E-03	6.8577E-03	1.3398E 02	1.3025E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE

GROUP 49 SYM PHI X/L SYM PHI X/L
MACH NO - 8 □ 0 - × 225 -


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 49
MACH NO = 8
RE NO = 2.14 X 10**6
CONFIG 2
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.95
32.00
24.00
16.00
8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
H X 10**4

2,

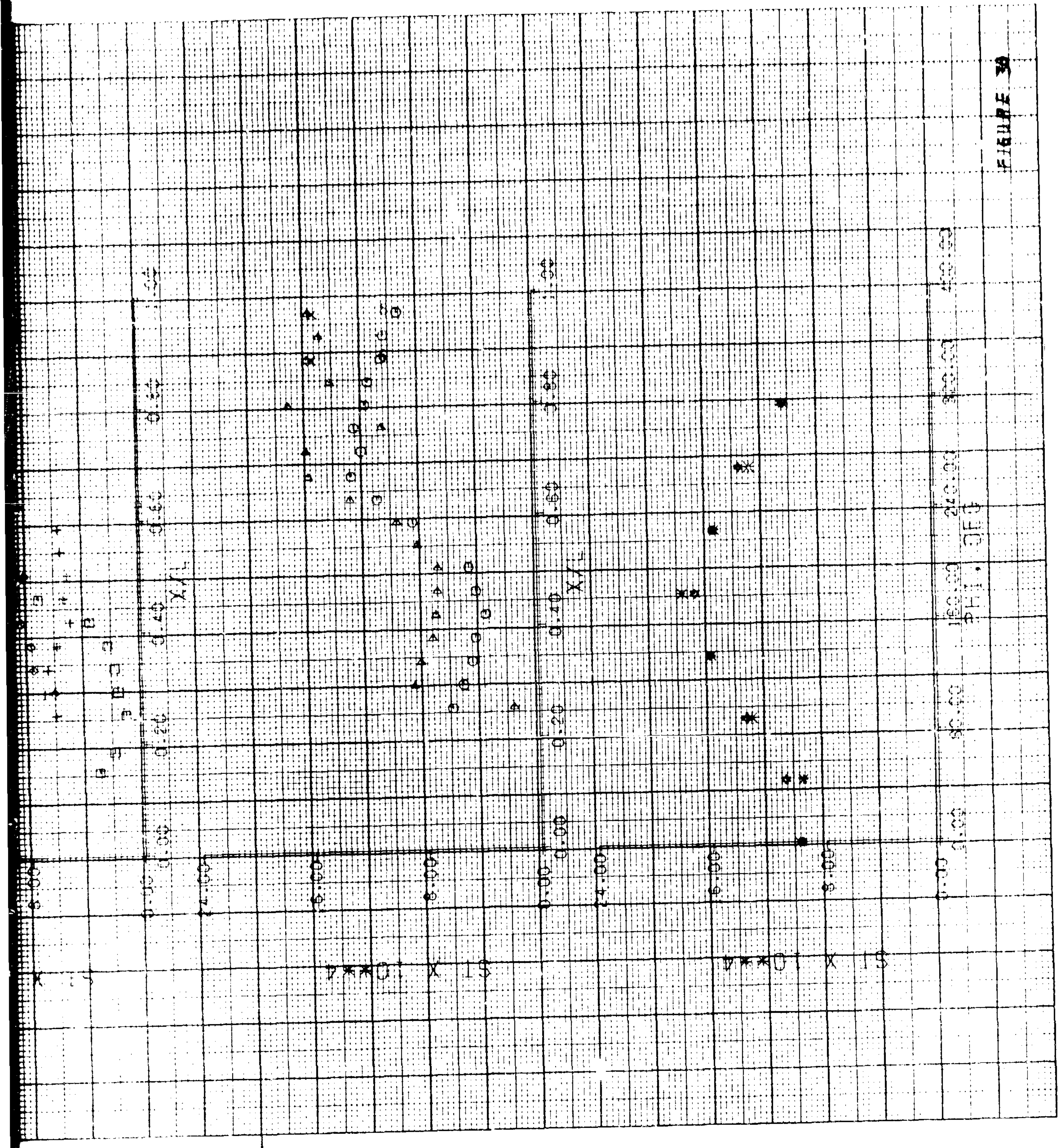


Figure 30

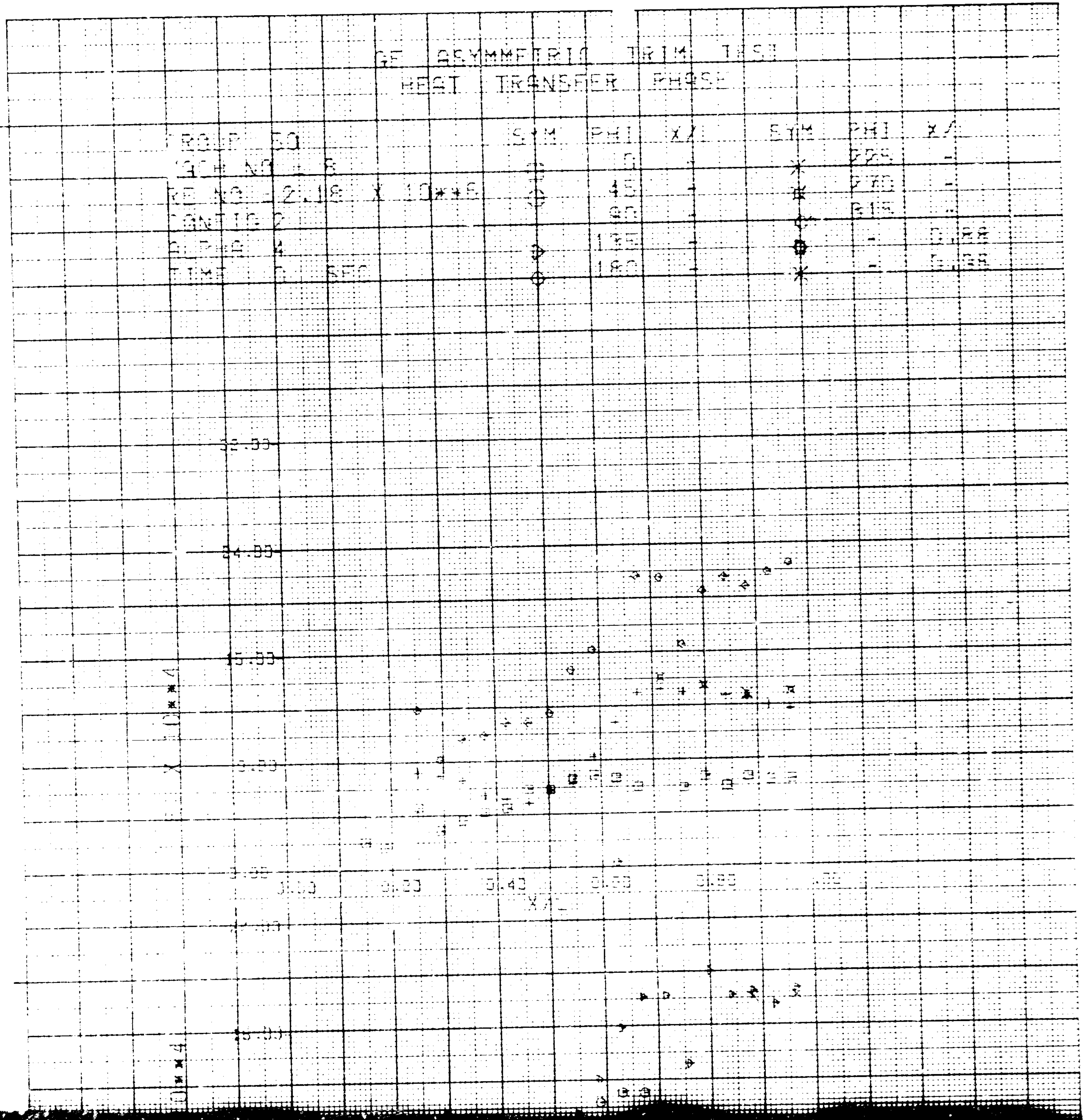
7/16/69

AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V10957-000

RUN CONFIG ALPHA-M BETA-M ALPHA-S ROLL ALP-P DATE MACH NO PO TO TIME
[illegible] 2 4.03 .00 4.00 -.02 8 715 7.69 470.87 1294.05 -.00
[illegible] P-INF Q-INF V-INF RHO-INF MU-INF RE/FT RE/IN HO
[illegible] [illegible] 2.1772E 00 3.7968E 03 6.3377E-05 1.5717E-08 2.3751E 06 1.9964E 05 2.1693E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDN	HT	HM	HW	ST
1	.1536	0	535.91	9.2260E-01	2.1142E-01	2.7863E-04	1.1217E-03	1.2843E 02	2.1169E-04
2	.1867	0	532.63	7.4977E-01	1.6905E-01	2.2173E-04	8.9347E-04	1.2770E 02	1.6961E-04
3	.2524	0	532.71	1.0811E 00	4.0799E-01	6.6041E-04	2.4742E-03	1.2777E 02	6.6693E-04
4	.2943	0	538.06	9.2270E-01	2.9078E-01	3.4423E-04	1.5470E-03	1.2904E 02	2.9209E-04
5	.3363	0	539.39	1.1521E 00	3.6364E-01	4.8136E-04	1.9389E-03	1.2936E 02	3.6591E-04
6	.3783	0	541.76	1.4650E 00	4.2221E-01	5.5989E-04	2.2551E-03	1.2960E 02	4.2957E-04
7	.4203	0	541.30	1.5510E 00	4.5006E-01	5.9604E-04	2.4087E-03	1.2981E 02	4.5456E-04
8	.4623	0	542.64	2.1350E 00	5.8847E-01	7.8232E-04	3.1506E-03	1.3013E 02	5.9958E-04
9	.5043	0	542.78	2.1504E 00	5.8319E-01	7.7573E-04	3.1240E-03	1.3016E 02	5.8955E-04
10	.5463	0	545.02	2.3544E 00	6.6091E-01	8.8101E-04	3.5470E-03	1.3078E 02	6.6950E-04
11	.5882	0	547.96	2.4077E 00	6.8560E-01	9.1172E-04	3.6949E-03	1.3140E 02	6.9729E-04
12	.6302	0	550.20	2.4329E 00	6.5820E-01	8.8389E-04	3.5592E-03	1.3193E 02	6.7156E-04
13	.6722	0	549.74	2.3679E 00	5.9320E-01	7.9611E-04	3.2049E-03	1.3142E 02	6.0583E-04
14	.7170	315.0	549.91	3.1160E 00	8.3799E-01	1.1401E-03	4.5872E-03	1.3421E 02	8.0568E-04
15	.7563	0	554.17	2.1979E 00	5.7665E-01	7.7054E-04	3.1331E-03	1.3288E 02	5.9133E-04
16	.7996	0	555.86	2.1480E 00	6.5594E-01	8.9180E-04	3.5890E-03	1.3128E 02	6.7710E-04
17	.8409	0	556.12	2.1969E 00	5.8688E-01	7.9446E-04	3.1971E-03	1.3334E 02	6.0335E-04
18	.8822	0	556.57	2.6110E 00	6.5460E-01	8.8665E-04	3.5681E-03	1.3345E 02	6.7337E-04
19	.9235	0	555.97	2.5016E 00	6.2720E-01	8.4885E-04	3.4161E-03	1.3331E 02	6.4468E-04
20	.9648	0	553.73	2.6443E 00	6.1591E-01	8.5804E-04	3.4535E-03	1.3277E 02	6.5174E-04
21	.2524	45.0	531.77	1.6440E 00	4.8658E-01	6.3765E-04	2.5605E-03	1.2754E 02	4.8492E-04
22	.2943	45.0	536.37	1.5140E 00	4.3329E-01	5.7125E-04	2.3014E-03	1.2865E 02	4.3431E-04
23	.3363	45.0	538.17	1.4994E 00	4.2077E-01	5.5507E-04	2.2400E-03	1.2907E 02	4.2273E-04
24	.3783	45.0	539.31	1.0502E 00	3.1570E-01	4.1785E-04	1.6841E-03	1.2935E 02	3.1763E-04
25	.4203	45.0	541.41	1.1160E 00	3.2832E-01	4.3576E-04	1.7551E-03	1.2964E 02	3.3121E-04
26	.4623	45.0	544.27	1.3971E 00	3.9200E-01	5.2226E-04	2.1011E-03	1.3052E 02	3.9689E-04
27	.5043	45.0	545.72	2.1342E 00	5.6675E-01	7.5654E-04	3.0463E-03	1.3086E 02	5.7483E-04
28	.5463	315.0	558.05	3.1770E 00	8.1226E-01	1.1036E-03	4.4406E-03	1.3400E 02	8.3803E-04
29	.5882	45.0	550.30	3.7646E 00	1.0317E 00	1.3857E-03	5.5784E-03	1.3196E 02	1.0527E-03
30	.6302	45.0	552.53	4.0585E 00	1.0980E 00	1.4792E-03	5.9518E-03	1.3249E 02	1.1236E-03
31	.6722	45.0	553.71	4.4502E 00	1.0924E 00	1.4739E-03	5.9324E-03	1.3277E 02	1.1196E-03
32	.7170	45.0	555.21	4.1272E 00	9.6715E-01	1.3076E-03	5.2526E-03	1.3313E 02	9.9315E-04
33	.7563	45.0	556.90	3.3580E 00	9.2523E-01	1.2538E-03	5.0454E-03	1.3353E 02	9.5216E-04
34	.7996	45.0	558.16	3.1839E 00	8.9334E-01	1.2126E-03	4.8745E-03	1.3383E 02	9.2085E-04
35	.8409	45.0	559.45	3.1682E 00	8.5712E-01	1.1655E-03	4.6846E-03	1.3414E 02	8.8500E-04
36	.8822	45.0	559.52	3.0982E 00	8.1491E-01	1.1062E-03	4.4590E-03	1.3415E 02	8.4150E-04
37	.9235	45.0	559.24	3.1605E 00	8.0754E-01	1.0978E-03	4.4171E-03	1.3409E 02	8.3358E-04
38	.9648	45.0	557.82	3.1810E 00	7.6490E-01	1.0379E-03	4.1765E-03	1.3375E 02	7.8819E-04
39	.2524	90.0	536.06	2.4665E 00	7.2914E-01	9.6091E-04	3.8713E-03	1.2856E 02	7.3057E-04
40	.2943	90.0	540.22	2.1839E 00	7.0021E-01	9.2789E-04	3.7374E-03	1.2955E 02	7.0530E-04
41	.3363	90.0	541.20	2.0971E 00	6.6190E-01	8.7826E-04	3.5373E-03	1.2979E 02	6.6755E-04
42	.3783	90.0	542.95	1.7287E 00	5.4563E-01	7.2567E-04	2.9224E-03	1.3021E 02	5.5152E-04
43	.4203	90.0	544.85	1.7384E 00	5.1388E-01	6.8514E-04	2.7549E-03	1.3065E 02	5.2066E-04
44	.4623	90.0	544.07	1.5677E 00	4.8700E-01	6.4917E-04	2.6141E-03	1.3061E 02	4.9333E-04
45	.5043	90.0	546.95	2.0776E 00	5.7245E-01	7.6541E-04	3.0818E-03	1.3116E 02	5.8159E-04
46	.5463	90.0	549.77	2.1791E 00	6.2228E-01	8.3519E-04	3.3622E-03	1.3183E 02	6.3451E-04
47	.5882	90.0	550.55	2.9089E 00	8.1617E-01	1.0966E-03	4.4143E-03	1.3201E 02	8.3305E-04
48	.6302	90.0	552.69	3.8516E 00	1.0612E 00	1.4299E-03	5.7565E-03	1.3253E 02	1.0862E-03
49	.6722	90.0	554.67	5.0705E 00	1.2703E 00	1.7161E-03	6.9069E-03	1.3300E 02	1.3035E-03
50	.7170	90.0	556.84	5.4821E 00	1.2910E 00	1.7493E-03	7.0394E-03	1.3352E 02	1.3285E-03
51	.7563	90.0	556.26	4.8769E 00	1.2704E 00	1.7200E-03	6.9218E-03	1.3337E 02	1.3063E-03
52	.7996	90.0	557.51	5.9759E 00	1.5567E 00	2.1113E-03	8.4960E-03	1.3368E 02	1.6034E-03
53	.8409	90.0	557.92	4.9531E 00	1.2409E 00	1.6838E-03	6.7756E-03	1.3377E 02	1.2787E-03
54	.8822	90.0	558.40	4.9825E 00	1.2231E 00	1.6608E-03	6.6826E-03	1.3389E 02	1.2611E-03
55	.9235	90.0	557.84	4.8507E 00	1.1687E 00	1.5854E-03	6.3795E-03	1.3372E 02	1.2039E-03
56	.9648	90.0	555.79	4.7558E 00	1.1461E 00	1.5507E-03	6.2487E-03	1.3326E 02	1.1777E-03
57	.2524	135.0	531.49	8.4003E-01	2.4832E-01	3.2530E-04	1.3109E-03	1.2748E 02	2.4738E-04
58	.2943	135.0	536.16	3.0511E 00	9.7825E-01	1.2894E-03	5.1946E-03	1.2859E 02	9.8031E-04
59	.3363	135.0	536.48	2.6225E 00	8.2774E-01	1.0915E-03	4.3971E-03	1.2866E 02	8.2981E-04
60	.3783	135.0	536.01	2.6957E 00	7.7527E-01	1.0216E-03	4.1159E-03	1.2855E 02	7.7675E-04
61	.4203	135.0	538.26	2.8203E 00	8.4777E-01	1.1205E-03	4.5137E-03	1.2909E 02	8.5181E-04
62	.4623	135.0	539.72	2.7032E 00	7.8543E-01	1.0401E-03	4.1896E-03	1.2944E 02	7.9064E-04
63	.5043	135.0	541.70	3.1915E 00	8.1544E-01	1.0827E-03	4.3607E-03	1.2991E 02	8.2293E-04
64	.5463	135.0	543.39	3.6076E 00	9.5801E-01	1.2749E-03	5.1340E-03	1.3031E 02	9.6888E-04
65	.5882	135.0	546.31	4.5254E 00	1.2017E 00	1.6054E-03	6.4642E-03	1.3101E 02	1.2199E-03
66	.6302	135.0	548.40	5.9339E 00	1.5757E 00	2.1110E-03	8.4989E-03	1.3150E 02	1.6039E-03
67	.6722	135.0	552.50	7.4563E 00	1.7931E 00	2.4154E-03	9.7223E-03	1.3240E 02	1.8348E-03
68	.7170	135.0	554.01	7.6311E 00	1.7971E 00	2.4257E-03	9.7629E-03	1.3284E 02	1.8424E-03
69	.7563	135.0	551.76	4.4466E 00	1.3038E 00	1.7565E-03	7.0674E-03	1.3230E 02	1.3328E-03
70	.7996	135.0	556.22	6.7591E 00	1.9639E 00	2.6589E-03	1.0700E-02	1.3337E 02	2.0193E-03
71	.8409	135.0	556.12	6.5037E 00	1.7920E 00	2.4257E-03	9.7619E-03	1.3334E 02	1.8422E-03
72	.8822	135.0	556.07	6.7325E 00	1.8214E 00	2.4654E-03	9.9218E-03	1.3333E 02	1.8724E-03
73	.9235	135.0	555.59	7.0240E 00	1.7242E 00	2.3323E-03	9.3862E-03	1.3322E 02	1.7713E-03
74	.9648	135.0	556.84	7.6555E 00	1.8410E 00	2.4945E-03	1.0038E-02	1.3351E 02	1.8944E-03
75	.2524	180.0	532.96	4.1221E 00	1.1977E 00	1.5720E-03	6.3363E-03	1.2783E 02	1.1954E-03
76	.2943	180.0	537.20	2.4691E 00	8.2369E-01	1.0872E-03	4.3796E-03	1.2884E 02	8.2657E-04
77	.3363	180.0	539.55	3.2951E 00	9.7405E-01	1.2896E-03	5.1945E-03	1.2939E 02	9.8030E-04
78	.3783	180.0	541.07	3.3026E 00	9.9276E-01	1.3170E-03	5.3045E-03	1.2976E 02	1.0011E-03
79	.4203	180.0	543.87	3.8661E 00	1.0837E 00	1.4414E-03	5.8055E-03	1.3023E 02	1.0956E-03
80	.4623	180.0	545.08	3.7878E 00	1.0817E 00	1.4427E-03	5.8093E-03	1.3071E 02	1.0963E-03
81	.5043	180.0	547.28	4.5541E 00	1.1409E 00	1.5261E-03	6.1447E-03	1.3124E 02	1.1596E-03
82	.5463	180.0	549.97	5.4740E 00	1.4542E 00	1.9522E-03	7.8590E-03	1.3189E 02	1.4831E-03
83	.5882	180.0	552.59	6.0075E 00	1.5953E 00	2.1492E-03	8.6509E-03	1.3250E 02	1.6326E-03
84	.6302	180.0	538.67	1.3322E-01	3.9376E-02	4.6782E-05	1.8845E-04	1.2918E 02	3.5563E-05
85	.6722	180.0	560.30	8.7796E 00	2.1113E 00	2.8743E-03	1.1564E-02	1.3434E 02	2.1824E-03
86	.7170	180.0	562.16	8.8680E 00	2.0083E 00	2.8510E-03	1.1469E-02	1.3483E 02	2.1645E-03
87	.7563	180.0	559.74	6.7076E 00	1.6130E 00	2.1943E-03	8.8299E-03	1.3421E 02	1.6662E-03
88	.7996	180.0	564.78	7.6137E 00	1.9834E 00	2.7167E-03	1.0928E-02	1.3541E 02	2.0622E-03
89	.8409	180.0	564.96	8.1486E 00	2.0821E 00	2.8526E-03	1.1473E-02	1.3545E 02	2.1654E-03
90	.8822	180.0	564.61	8.7385E 00	2.0137E 00	2.7577E-03	1.1093E-02	1.3537E 02	2.0934E-03
91	.9235	180.0	564.11	8.4275E 00	2.1166E 00	2.8965E-03	1.1642E-02	1.3525E 02	2.1989E-03
92	.9648	180.0	563.67	8.6609E 00	2.1802E 00	2.9815E-03	1.1993E-02	1.3513E 02	2.2634E-03
93	.8822	225.0	566.58	6.8342E 00	1.7462E 00	2.3977E-03	9.6437E-03	1.3584E 02	1.8199E-03
94	.9648	225.0	561.69	7.3537E 00	1.7684E 00	2.4180E-03	9.7269E-03	1.3510E 02	1.8356E-03
95	[illegible]	270.0	562.47	6.0574E 00	1.3656E 00	1.8646E-03	7.5012E-03	1.3486E 02	1.4156E-03
96	[illegible]	270.0	567.17	4.0019E 00	1.3022E 00	1.7896E-03	7.1975E-03	1.3598E 02	1.3583E-03
97	.8822	270.0	567.15	4.7390E 00	1.2364E 00	1.6991E-03	6.8335E-03	1.3597E 02	1.2896E-03
98	.9648	270.0	562.18	5.2408E 00	1.2603E 00	1.7261E-03	6.9262E-03	1.3479E 02	1.3060E-03

11


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 50
BCH NO 8
RE NO 2.18 X 10**6
CONFIG 2
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.98
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
X 10**4
X 10**4

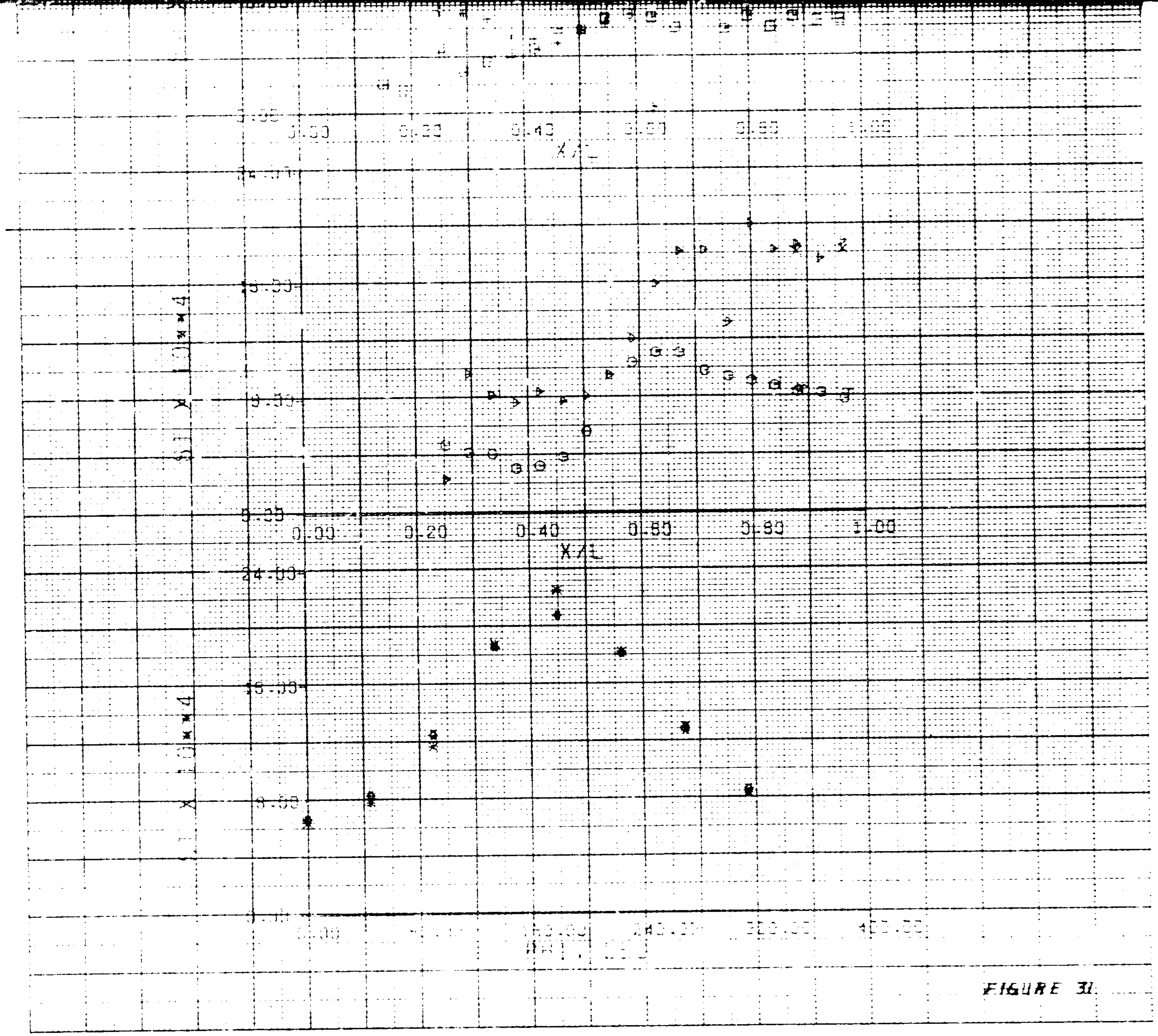

0.00
0.20
0.40
0.60
0.80
1.00
X/L
X 10**4
24.00
16.00
8.00
X 10**4
0.00
160.00
240.00
320.00
400.00
FIGURE 31

Figure 31

7/16/69

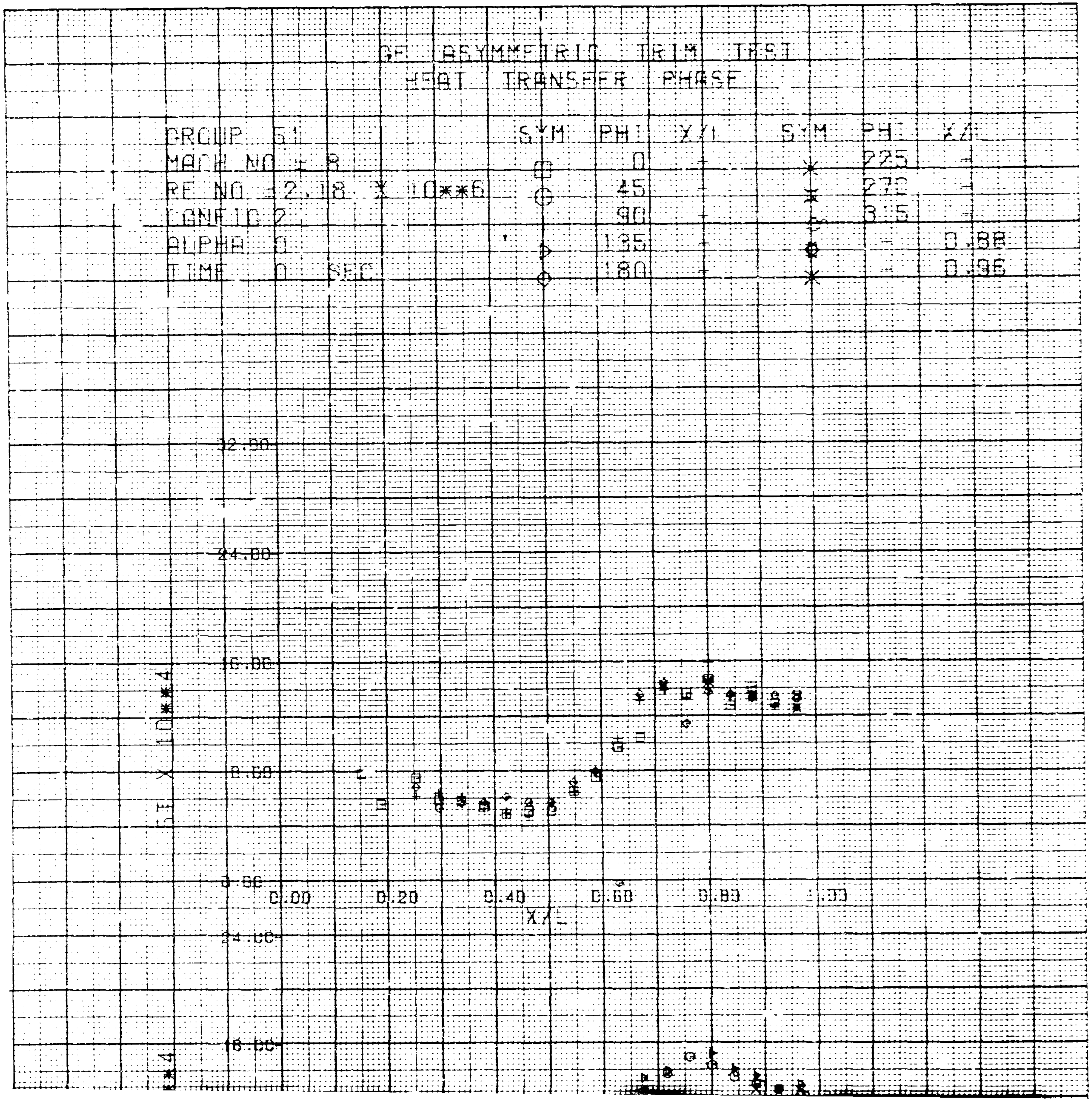
AEDC(ARO,INC.) ARNOLD AF S, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-400

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
51	2	.02	0	-.02	0	0	7.15	7.99	472.47	1290.14	-.6

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU INF	RE/FT	RE/D	HO
9.42070E 01	4.84181E-02	2.10123E 00	3.86104E 03	4.34326E-05	7.59111E-08	2.17511E 06	1.99497E 06	3.17720E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-BTU	HT	HM	HW	ST
1	.1588	0	524.87	7.8765E 00	7.9919E-01	1.0332E-03	4.1645E-03	1.2586E 02	7.3391E-04
2	.1667	0	526.64	2.4920E 00	5.6925E-01	7.3787E-04	2.9737E-03	1.2633E 02	5.5975E-04
3	.2524	0	528.99	2.5780E 00	7.6232E-01	9.9111E-04	3.9917E-03	1.2688E 02	7.5177E-04
4	.2943	0	530.10	1.8842E 00	5.9471E-01	7.7431E-04	3.1119E-03	1.2715E 02	5.8729E-04
5	.3363	0	531.42	1.8764E 00	5.9230E-01	7.7260E-04	3.1120E-03	1.2746E 02	5.8595E-04
6	.3783	0	532.03	1.8229E 00	5.6795E-01	7.1597E-04	2.8844E-03	1.2779E 02	5.4296E-04
7	.4203	0	533.41	1.5932E 00	4.9197E-01	6.4331E-04	2.5916E-03	1.2793E 02	4.8784E-04
8	.4623	0	535.14	1.6667E 00	5.1634E-01	6.7010E-04	2.7154E-03	1.2835E 02	5.1115E-04
9	.5043	0	535.83	1.6878E 00	5.1673E-01	6.6997E-04	2.6987E-03	1.2851E 02	5.0799E-04
10	.5463	0	538.43	2.1344E 00	6.5499E-01	8.6214E-04	3.4723E-03	1.2913E 02	6.5361E-04
11	.5882	0	540.28	2.7509E 00	7.5795E-01	1.0001E-03	4.0275E-03	1.2957E 02	7.5813E-04
12	.6302	0	542.59	3.4909E 00	9.7365E-01	1.2886E-03	5.1888E-03	1.3012E 02	9.7673E-04
13	.6722	0	547.83	4.1115E 00	1.0360E 00	1.3727E-03	5.5258E-03	1.3137E 02	1.0402E-03
99	.8822	315.0	551.29	5.4126E 00	1.3058E 00	1.7483E-03	7.0384E-03	1.3219E 02	1.3245E-03
15	.7583	0	547.61	5.4403E 00	1.3564E 00	1.8072E-03	7.2750E-03	1.3132E 02	1.3694E-03
16	.7996	0	547.94	5.1865E 00	1.4552E 00	1.9397E-03	7.8082E-03	1.3139E 02	1.4698E-03
17	.8409	0	547.91	4.9514E 00	1.2651E 00	1.6863E-03	6.7880E-03	1.3138E 02	1.2778E-03
18	.8822	0	548.47	5.5708E 00	1.3956E 00	1.8616E-03	7.4934E-03	1.3152E 02	1.4105E-03
19	.9235	0	548.16	5.1886E 00	1.2798E 00	1.7064E-03	6.8689E-03	1.3144E 02	1.2930E-03
20	.9648	0	550.89	5.4210E 00	1.3277E 00	1.7767E-03	7.1510E-03	1.3210E 02	1.3461E-03
21	.2524	45.0	526.08	2.2987E 00	6.7715E-01	8.7785E-04	3.5347E-03	1.2619E 02	6.6536E-04
22	.2943	45.0	527.01	1.9557E 00	6.2702E-01	8.1310E-04	3.2748E-03	1.2641E 02	6.1682E-04
23	.3363	45.0	528.66	1.9052E 00	5.9075E-01	7.6771E-04	3.0936E-03	1.2680E 02	5.8233E-04
24	.3783	45.0	529.79	1.8205E 00	5.4724E-01	7.1221E-04	2.8698E-03	1.2707E 02	5.4020E-04
25	.4203	45.0	532.21	1.6072E 00	4.6760E-01	6.0970E-04	2.4564E-03	1.2765E 02	4.6239E-04
26	.4623	45.0	535.36	1.7678E 00	4.9601E-01	6.5025E-04	2.6193E-03	1.2840E 02	4.9305E-04
27	.5043	45.0	537.03	2.4605E 00	5.4717E-01	7.1890E-04	2.8950E-03	1.2880E 02	5.4505E-04
100	.9648	315.0	555.50	5.0669E 00	1.2105E 00	1.6407E-03	6.6018E-03	1.3319E 02	1.2427E-03
29	.5882	45.0	540.60	2.8997E 00	7.9895E-01	1.0546E-03	4.2471E-03	1.2965E 02	7.9946E-04
30	.6302	45.0	543.09	3.5541E 00	9.6152E-01	1.2734E-03	5.1274E-03	1.3024E 02	9.6517E-04
31	.6722	45.0	550.79	5.0277E 00	1.2341E 00	1.6513E-03	6.6462E-03	1.3207E 02	1.2511E-03
32	.7170	45.0	552.67	5.8400E 00	1.3753E 00	1.8448E-03	7.4241E-03	1.3252E 02	1.3975E-03
33	.7583	45.0	548.33	5.4341E 00	1.4972E 00	1.9968E-03	8.0377E-03	1.3149E 02	1.5130E-03
34	.7996	45.0	548.75	5.1138E 00	1.4348E 00	1.9146E-03	7.7068E-03	1.3159E 02	1.4507E-03
35	.8409	45.0	549.99	4.9988E 00	1.3524E 00	1.8076E-03	7.2754E-03	1.3188E 02	1.3695E-03
36	.8822	45.0	549.08	4.9300E 00	1.2967E 00	1.7329E-03	6.9750E-03	1.3165E 02	1.3138E-03
37	.9235	45.0	549.80	4.9140E 00	1.2556E 00	1.6778E-03	6.7531E-03	1.3184E 02	1.2712E-03
38	.9648	45.0	553.64	4.8420E 00	1.1644E 00	1.5640E-03	6.2937E-03	1.3275E 02	1.1847E-03
39	.2524	90.0	528.25	2.1400E 00	6.3279E-01	8.2191E-04	3.3121E-03	1.2671E 02	6.2345E-04
40	.2943	90.0	529.09	2.0567E 00	6.5942E-01	8.5743E-04	3.4550E-03	1.2690E 02	6.5037E-04
41	.3363	90.0	530.16	1.9691E 00	6.2151E-01	8.0927E-04	3.2608E-03	1.2716E 02	6.1381E-04
42	.3783	90.0	532.01	1.7075E 00	5.3894E-01	7.0345E-04	2.8341E-03	1.2760E 02	5.3349E-04
43	.4203	90.0	534.31	1.7168E 00	5.0749E-01	6.6439E-04	2.6764E-03	1.2815E 02	5.0381E-04
44	.4623	90.0	534.18	1.5495E 00	4.8134E-01	6.3084E-04	2.5381E-03	1.2812E 02	4.7776E-04
45	.5043	90.0	536.78	2.0909E 00	5.7612E-01	7.5668E-04	3.0478E-03	1.2874E 02	5.7371E-04
46	.5463	90.0	539.66	2.7085E 00	6.5924E-01	8.6914E-04	3.5002E-03	1.2942E 02	6.5888E-04
47	.5882	90.0	540.46	2.9043E 00	8.1489E-01	1.0755E-03	4.3310E-03	1.2961E 02	8.1526E-04
48	.6302	90.0	542.80	3.7846E 00	1.0428E 00	1.3805E-03	5.5587E-03	1.3017E 02	1.0464E-03
49	.6722	90.0	550.88	5.7281E 00	1.3077E 00	1.7495E-03	7.0416E-03	1.3205E 02	1.3255E-03
50	.7170	90.0	552.57	5.4574E 00	1.3794E 00	1.8500E-03	7.4452E-03	1.3250E 02	1.4015E-03
51	.7583	90.0	545.55	5.0812E 00	1.3237E 00	1.7588E-03	7.0807E-03	1.3082E 02	1.3329E-03
52	.7996	90.0	546.70	6.0954E 00	1.5878E 00	2.1130E-03	8.5063E-03	1.3110E 02	1.6012E-03
53	.8409	90.0	546.51	5.3495E 00	1.3402E 00	1.7830E-03	7.1778E-03	1.3105E 02	1.3511E-03
54	.8822	90.0	546.99	5.4650E 00	1.3415E 00	1.7856E-03	7.1883E-03	1.3116E 02	1.3531E-03
55	.9235	90.0	546.38	5.7693E 00	1.2672E 00	1.6855E-03	6.7856E-03	1.3102E 02	1.2773E-03
56	.9648	90.0	550.00	5.1609E 00	1.2611E 00	1.6589E-03	6.6769E-03	1.3188E 02	1.2568E-03
57	.2524	135.0	523.20	9.8487E-01	1.7289E-01	2.2310E-04	8.9929E-04	1.2551E 02	1.6926E-04
58	.2943	135.0	523.93	2.1040E 00	6.7478E-01	8.7155E-04	3.5129E-03	1.2568E 02	6.5126E-04
59	.3363	135.0	524.54	2.0651E 00	6.5181E-01	8.4255E-04	3.3959E-03	1.2582E 02	6.3924E-04
60	.3783	135.0	524.77	1.8031E 00	5.6011E-01	7.2423E-04	2.9190E-03	1.2588E 02	5.4947E-04
61	.4203	135.0	527.53	1.8678E 00	5.9152E-01	7.6759E-04	3.0933E-03	1.2654E 02	5.8227E-04
62	.4623	135.0	529.47	1.9223E 00	5.5854E-01	7.2661E-04	2.9278E-03	1.2700E 02	5.5113E-04
63	.5043	135.0	531.49	2.2246E 00	5.6841E-01	7.4141E-04	2.9871E-03	1.2748E 02	5.6230E-04
64	.5463	135.0	533.31	2.6532E 00	7.0457E-01	9.2119E-04	3.7111E-03	1.2791E 02	6.9857E-04
65	.5882	135.0	535.76	3.2294E 00	8.5757E-01	1.1248E-03	4.5309E-03	1.2849E 02	8.5289E-04
66	.6302	135.0	538.24	4.2988E 00	1.1415E 00	1.5022E-03	6.0501E-03	1.2908E 02	1.1389E-03
67	.6722	135.0	547.74	5.6085E 00	1.3468E 00	1.7948E-03	7.2248E-03	1.3135E 02	1.3600E-03
68	.7170	135.0	548.83	5.9362E 00	1.3979E 00	1.8656E-03	7.5093E-03	1.3161E 02	1.4135E-03
69	.7583	135.0	541.56	2.7488E 00	7.7127E-01	1.0194E-03	4.1049E-03	1.2987E 02	7.7270E-04
70	.7996	135.0	544.70	5.2537E 00	1.5265E 00	2.0260E-03	8.1570E-03	1.3062E 02	1.5355E-03
71	.8409	135.0	545.03	5.1257E 00	1.4123E 00	1.8752E-03	7.5497E-03	1.3070E 02	1.4211E-03
72	.8822	135.0	545.00	5.0451E 00	1.3649E 00	1.8122E-03	7.2962E-03	1.3069E 02	1.3734E-03
73	.9235	135.0	545.27	5.1298E 00	1.2592E 00	1.6725E-03	6.7335E-03	1.3076E 02	1.2675E-03
74	.9648	135.0	551.01	5.3737E 00	1.2923E 00	1.7296E-03	6.9613E-03	1.3213E 02	1.3104E-03
75	.2524	180.0	525.30	2.4461E 00	7.1875E-01	9.1964E-04	3.[illegible]045E-03	1.2600E 02	6.9770E-04
76	.2943	180.0	526.89	1.7095E 00	5.4811E-01	7.1063E-04	2.8639E-03	1.2637E 02	5.3909E-04
77	.3363	180.0	528.90	1.9754E 00	5.8394E-01	7.5909E-04	3.0588E-03	1.2686E 02	5.7579E-04
78	.3783	180.0	530.90	1.9415E 00	5.8361E-01	7.6065E-04	3.0647E-03	1.2734E 02	5.7690E-04
79	.4203	180.0	533.39	2.1124E 00	6.2455E-01	8.1665E-04	3.2900E-03	1.2793E 02	6.1929E-04
80	.4623	180.0	535.32	2.0410E 00	5.8309E-01	7.6435E-04	3.0789E-03	1.2839E 02	5.7957E-04
81	.5043	180.0	537.94	2.1086E 00	5.7834E-01	7.6076E-04	3.0640E-03	1.2901E 02	5.7677E-04
82	.5463	180.0	540.56	2.7343E 00	7.2609E-01	9.5839E-04	3.8595E-03	1.2963E 02	7.2650E-04
83	.5882	180.0	543.09	3.0271E 00	8.0304E-01	1.0646E-03	4.2865E-03	1.3024E 02	8.0080E-04
84	.6302	180.0	538.80	-4.9807E-02	-1.3226E-02	-1.7418E-05	-7.0148E-05	1.2922E 02	-1.3205E-05
85	.6722	180.0	555.27	5.5875E 00	1.3437E 00	1.8087E-03	7.2780E-03	1.3314E 02	1.3706E-03
86	.7170	180.0	556.84	6.0180E 00	1.4172E 00	1.9117E-03	7.6916E-03	1.3351E 02	1.4479E-03
87	.7583	180.0	550.47	4.7246E 00	1.1342E 00	1.5196E-03	6.1160E-03	1.3200E 02	1.1513E-03
88	.7996	180.0	553.75	5.7291E 00	1.3622E 00	1.8299E-03	7.3637E-03	1.3278E 02	1.3861E-03
89	.8409	180.0	554.13	5.2660E 00	1.3455E 00	1.8084E-03	7.2772E-03	1.3287E 02	1.3490E-03
90	.8822	180.0	554.08	5.7142E 00	1.3160E 00	1.7697E-03	7.1213E-03	1.3286E 02	1.3405E-03
91	.9235	180.0	554.66	5.4279E 00	1.3326E 00	1.7926E-03	7.2110E-03	1.3299E 02	1.3574E-03
92	.9648	180.0	550.17	5.5591E 00	1.3041E 00	1.7623E-03	7.0901E-03	1.3383E 02	1.3346E-03
93	.8822	225.0	556.82	4.8585E 00	1.2414E 00	1.6745E-03	6.7375E-03	1.3351E 02	1.2682E-03
94	.9648	225.0	558.59	5.1235E 00	1.2321E 00	1.6660E-03	6.7023E-03	1.3393E 02	1.2616E-03
95	.7170	270.0	559.22	6.2270E 00	1.4039E 00	1.8999E-03	7.6410E-03	1.3408E 02	1.4387E-03
96	.7996	270.0	557.45	5.9463E 00	1.4197E 00	1.9167E-03	7.7114E-03	1.3366E 02	1.4516E-03
97	.8822	270.0	558.02	5.1395E 00	1.3132E 00	1.7743E-03	7.1383E-03	1.3380E 02	1.3437E-03
98	.9648	270.0	558.12	5.1223E 00	1.2310E 00	1.6645E-03	6.6967E-03	1.3382E 02	1.2606E-03

GROUP 51 GH ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PH X/L SYM PH X/L
MACH NO 6


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 51
MACH NO = 8
RE NO =2.18 X 10**6
CONFIG 2
ALPHA 0
TIME 0 SEC
SYM PHI X/L
□ 0 -
○ 45 -
90 -
△ 135 -
◇ 180 -
SYM PHI X/L
✶ 225 -
270 -
315 -
- 0.88
- 0.96
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
ST X 10**4

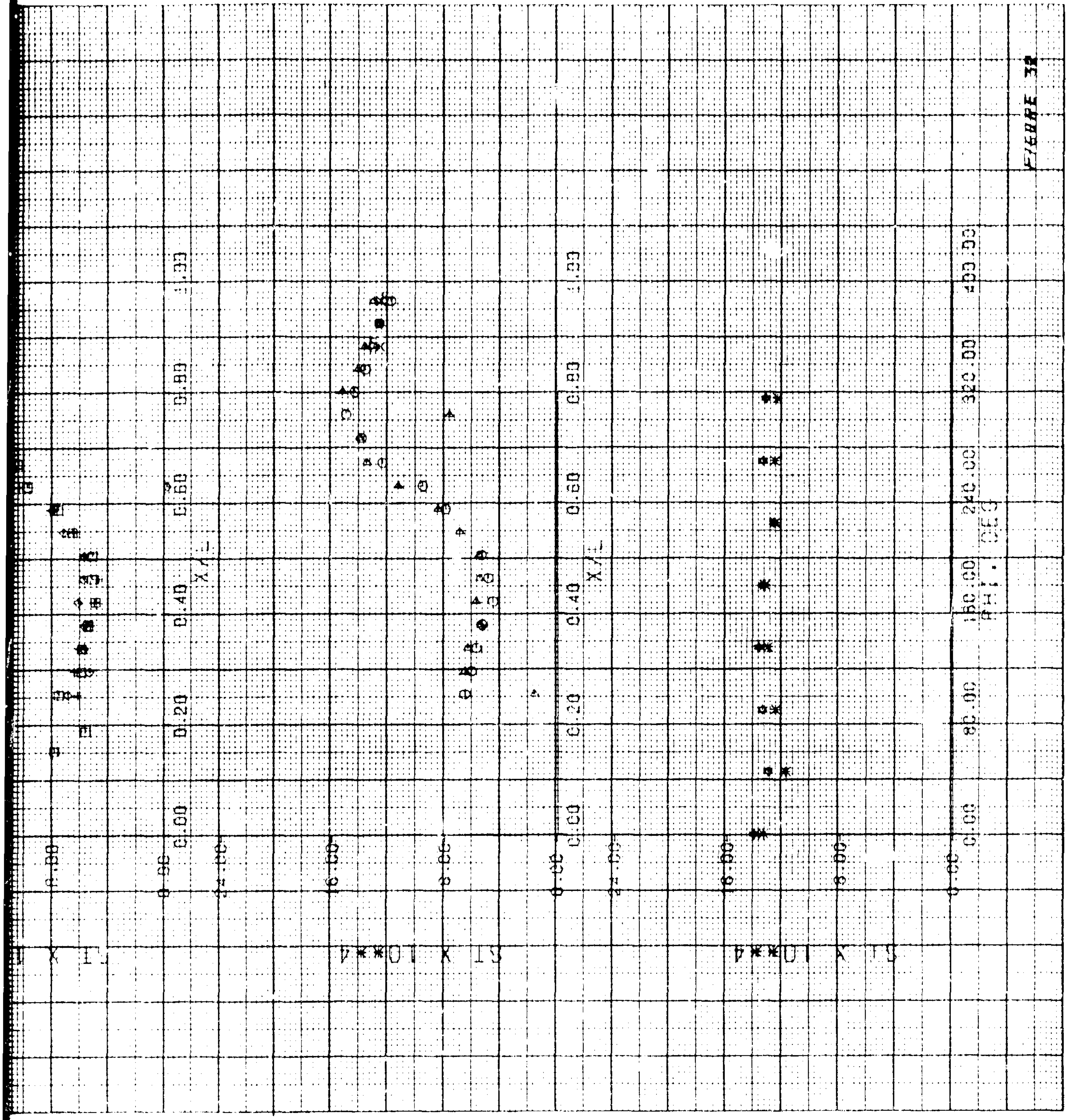
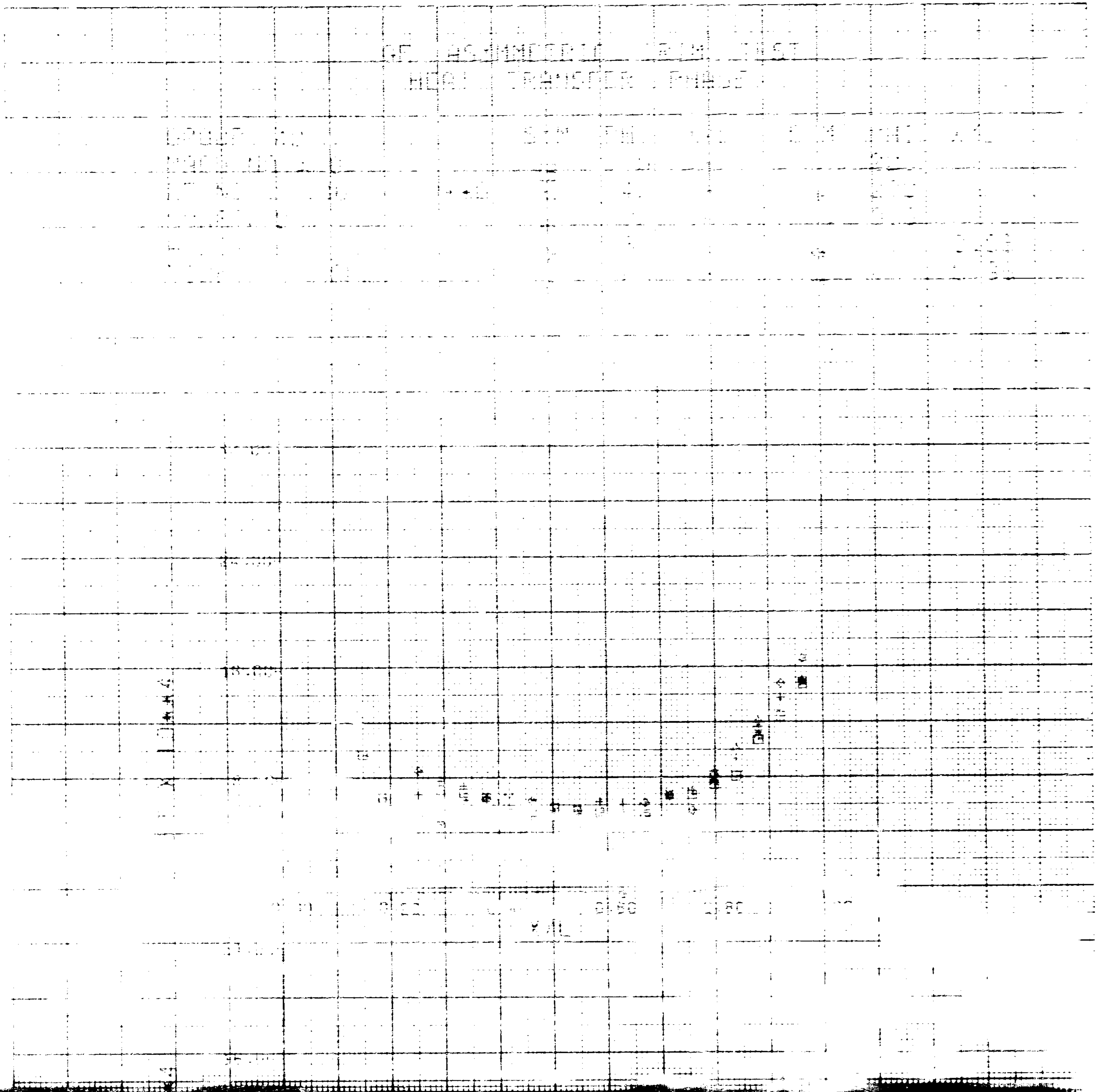


FIGURE 32
X/L
0.00
0.20
0.40
0.60
0.80
1.00
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
ST X 10**4
0.00
8.00
16.00
24.00
U X 1
0.96
1.00

Figure 32

```
                                        7/16/69

                          [illegible] ARNOLD A F S, TENNESSEE
                          VON KARMAN GAS DYNAMICS FACILITY
                            50 INCH HYPERSONIC TUNNEL B
                                  V1006 [illegible]
GROUP  CONFIG    ALPHA-M      BETA-M       ALPHA-S      [illegible]  ALPHA  DATE     MACH NO      PO          TO          TIME
 42      3          .02          0            .0           .0        0    715       7.97       279.26      1258.20      -.01
  T-INF       P-INF       Q-INF       V-INF       RHO-INF       MU-INF       RE/FT        HE          [illegible]
 9.18[illegible] 01  2.911[illegible]-02  1.30[illegible] 00  3.74[illegible] 03  2.67[illegible]-05  [illegible]-08  [illegible] 06  [illegible] 00  3.0[illegible] 02

TC NO   X/L     PHI    TEMP      SLOPE        Q-STAR        H1            H?           HW          ST

  1    .1108     0    515.91  [illegible] 00  5.7505E-01  7.9725E-05  3.21[illegible]-01  1.20[illegible] 02  [illegible]-04
  2    .1467     0    533.01  1.4946E 00  1.9619E-01  5.5633E-04  2.2058E-03  1.27[illegible] 02  8.0197E-04
  3    .2524     0    533.56  1.1271E 00  3.3317E-01  4.5976E-04  1.8562E-03  1.27[illegible] 02  5.7051E-04
  4    .2943     0    538.31  1.0510E 00  [illegible]-01  5.9213E-04  2.1960E-03  1.29[illegible] 02  7.41[illegible]-04
  5    .3363     0    540.08  1.1094E 00  [illegible]-01  5.7218E-04  2.3052E-03  1.29[illegible] 02  7.10[illegible]-04
  6    .3783     0    542.42  1.1001E 00  [illegible]-01  5.5852E-04  2.2115E-03  1.30[illegible] 02  6.80[illegible]-04
  7    .4203     0    542.92  1.1217E 00  [illegible]-01  6.5625E-04  [illegible]-03  1.30[illegible] 02  5.70[illegible]-04
  8    .4623     0    544.19  1.1[illegible] 00  3.2007E-01  [illegible]-04  1.8591E-03  1.305[illegible] 02  5.7[illegible]-04
  9    .5043     0    544.49  1.2714E 00  3.4436E-01  4.5125E-04  1.9476E-03  1.3057E 02  6.03[illegible]-04
 10    .5463     0    546.25  1.1901E 00  3.3[illegible]-01  4.6000E-04  1.8725E-03  1.3094E 02  5.60[illegible]-04
 11    .5882     0    547.14  1.1804E 00  3.2[illegible]-01  4.5[illegible]-04  1.8458E-03  1.3121E 02  5.72[illegible]-04
 12    .6302     0    547.79  1.1555E 00  3.0[illegible]-01  4.3821E-04  1.7560E-03  1.3136E 02  5.46[illegible]-04
 13    .6722     0    546.92  1.2244E 00  3.06[illegible]-01  4.3129E-04  1.7548E-03  1.3115E 02  5.39[illegible]-04
 14    .4522   315.0  559.37  2.1467E 00  6.1132E-01  8.7502E-04  3.52[illegible]-03  1.3416E 02  1.09[illegible]-03
 15    .7163     0    552.08  1.4453E 00  3.9506E-01  5.6021E-04  2.2537E-03  1.3238E 02  7.00[illegible]-04
 16    .7596     0    553.98  1.5494E 00  4.3474E-01  6.1732E-04  2.4806E-03  1.32[illegible] 02  7.71[illegible]-04
 17    .8169     0    554.95  1.8310E 00  4.6705E-01  6.6527E-04  2.6829E-03  1.3360E 02  8.[illegible]-04
 18    .8627     0    555.98  2.4612E 00  6.1657E-01  8.7799E-04  3.5406E-03  1.33[illegible] 02  1.09[illegible]-03
 19    .9215     0    555.06  2.8333E 00  7.0980E-01  1.0103E-03  4.0740E-03  1.3329E 02  1.26[illegible]-03
 20    .9648     0    554.37  1.5124E 00  [illegible]-01  1.2001E-03  4.03[illegible]-03  1.32[illegible] 02  1.[illegible]-03
 21    .2524    45.0  531.92  1.6087E 00  4.7554E-01  6.5476E-04  2.54[illegible]-03  1.2750E 02  8.19[illegible]-04
 22    .2943    45.0  536.74  1.1987E 00  4.4844E-01  6.2157E-04  2.50[illegible]-03  1.2872E 02  7.70[illegible]-04
 23    .3363    45.0  539.60  1.4113E 00  4.2425E-01  5.9037E-04  2.3827E-03  1.2941E 02  7.30[illegible]-04
 24    .3783    45.0  540.98  1.2332E 00  3.7070E-01  5.1605E-04  2.0849E-03  1.2973E 02  6.4[illegible]-04
 25    .4203    45.0  543.60  1.1728E 00  3.4077E-01  4.7647E-04  1.9227E-03  1.3022E 02  5.96[illegible]-04
 26    .4623    45.0  545.59  1.1861E 00  3.3279E-01  4.6701E-04  1.8812E-03  1.3083E 02  5.84[illegible]-04
 27    .5043    45.0  546.45  1.2463E 00  3.3043E-01  4.6425E-04  1.8[illegible]-03  1.3104E 02  5.80[illegible]-04
100    .9640   315.0  558.78  1.1375E 00  8.0263E-01  1.1476E-03  4.6257E-03  1.33[illegible] 02  1.4[illegible]-03
 29    .5882    45.0  548.57  1.1795E 00  3.2499E-01  4.5797E-04  1.8470E-03  1.3154E 02  5.72[illegible]-04
 30    .6302    45.0  549.[illegible]  1.2181E 00  3.2956E-01  4.6499E-04  1.8767E-03  1.31[illegible] 02  5.81[illegible]-04
 31    .6722    45.0  549.75  1.4890E 00  3.6566E-01  5.1612E-04  2.0819E-03  1.3189E 02  6.45[illegible]-04
 32    .7170    45.0  551.[illegible]  1.4009E 00  3.7699E-01  5.3343E-04  2.1515E-03  1.322[illegible] 02  6.67[illegible]-04
 33    .7583    45.0  554.[illegible]  1.5850E 00  4.[illegible]-01  6.2082E-04  2.5030E-03  1.3293E 02  7.76[illegible]-04
 34    .7996    45.0  556.21  1.6650E 00  4.6739E-01  6.6580E-04  2.6847E-03  1.3336E 02  8.32[illegible]-04
 35    .8409    45.0  558.09  1.9611E 00  5.3057E-01  7.5783E-04  3.0555E-03  1.3391E 02  9.47[illegible]-04
 36    .8822    45.0  559.11  2.1221E 00  6.1077E-01  8.7367E-04  3.5224E-03  1.3406E 02  1.09[illegible]-03
 37    .9215    45.0  559.26  2.9416E 00  7.5162E-01  1.0753E-03  4.3354E-03  1.3409E 02  1.34[illegible]-03
 38    .9648    45.0  558.20  3.1941E 00  7.6812E-01  1.0973E-03  4.4262E-03  1.3384E 02  1.37[illegible]-03
 39    .2524    90.0  535.21  1.1672E 00  4.1006E-01  5.6717E-04  2.2847E-03  1.2836E 02  7.09[illegible]-04
 40    .2943    90.0  546.04  1.4445E 00  4.6313E-01  6.4488E-04  2.6027E-03  1.2951E 02  8.07[illegible]-04
 41    .3363    90.0  542.29  1.4022E 00  4.4257E-01  6.1816E-04  2.4945E-03  1.3004E 02  7.73[illegible]-04
 42    .3783    90.0  544.13  1.2426E 00  3.9215E-01  5.4921E-04  2.2[illegible]-03  1.3046E 02  6.87[illegible]-04
 43    .4203    90.0  545.09  1.7079E 00  3.5705E-01  5.0122E-04  2.0222E-03  1.3069E 02  6.2705E-04
 44    .4623    90.0  545.18  9.6320E-01  2.9923E-01  4.2003E-04  1.69[illegible]-03  1.30[illegible] 02  5.25[illegible]-04
 45    .5043    90.0  546.94  1.1748E 00  3.2370E-01  4.5510E-04  1.83[illegible]-03  1.3113E 02  5.69[illegible]-04
 46    .5463    90.0  548.77  1.1161E 00  3.1372E-01  4.4926E-04  1.8123E-03  1.31[illegible] 02  5.61[illegible]-04
 47    .5882    90.0  549.05  1.1196E 00  3.7025E-01  5.2210E-04  2.1061E-03  1.3156E 02  6.53[illegible]-04
 48    .6302    90.0  549.41  1.3930E 00  3.5626E-01  5.0252E-04  2.0275E-03  1.3174E 02  6.28[illegible]-04
 49    .6722    90.0  549.35  1.3365E 00  3.3431E-01  4.7163E-04  1.9035E-03  1.3173E 02  5.8992E-04
 50    .7170    90.0  551.36  1.6723E 00  3.9392E-01  5.5715E-04  2.2472E-03  1.3221E 02  6.96[illegible]-04
 51    .7583    90.0  552.39  1.5771E 00  4.1004E-01  5.8208E-04  2.3470E-03  1.3245E 02  7.2795E-04
 52    .7996    90.0  554.26  1.8833E 00  4.9000E-01  6.9993E-04  2.8[illegible]-03  1.32[illegible] 02  8.715[illegible]-04
 53    .8409    90.0  555.33  2.1521E 00  5.3914E-01  7.6705E-04  3.0[illegible]-03  1.3315E 02  9.59[illegible]-04
 54    .8822    90.0  556.79  [illegible].7251E 00  6.6842E-01  9.5368E-04  3.8[illegible]-03  1.3350E 02  1.19[illegible]-03
 55    .9235    90.0  556.07  3.5699E 00  7.8635E-01  1.1199E-03  4.51[illegible]-03  1.3333E 02  1.4003E-03
 56    .9648    90.0  554.14  3.5925E 00  8.6392E-01  1.2271E-03  4.9440E-03  1.3288E 02  1.53[illegible]-03
 57    .2524   135.0  511.43  2.4085E-01  7.1199E-02  9.7469E-05  3.4[illegible]-04  1.22[illegible] 02  1.22[illegible]-04
 58    .2943   135.0  535.29  1.4660E 00  4.7004E-01  6.5070E-04  2.6248E-03  1.283[illegible] 02  8.1[illegible]-04
 59    .3363   135.0  536.07  1.3824E 00  4.3631E-01  6.[illegible]-04  2.4410E-03  1.2870E 02  7.57[illegible]-04
 60    .3783   135.0  535.75  1.2617E 00  3.9257E-01  5.4339E-04  2.1916E-03  1.2849E 02  6.80[illegible]-04
 61    .4203   135.0  538.7[illegible]  1.1908E 00  3.9103E-01  5.4150E-04  2.1917E-03  1.2920E 02  6.80[illegible]-04
 62    .4623   135.0  539.98  1.1842E 00  3.4403E-01  4.7961E-04  1.93[illegible]-03  1.2948E 02  [illegible]-04
 63    .5043   135.0  540.96  1.1378E 00  3.1629E-01  4.4098E-04  1.7770E-03  1.2973E 02  [illegible]-04
 64    .5463   135.0  541.67  1.0955E 00  3.0584E-01  4.2384E-04  1.7525E-03  1.2990E 02  [illegible]-04
 65    .5882   135.0  542.68  1.1280E 00  2.9953E-01  4.1852E-04  1.6882E-03  1.3014E 02  5.21[illegible]-04
 66    .6302   135.0  543.27  1.1[illegible] 00  3.6[illegible]-01  5.1195E-04  2.0650E-03  1.30[illegible] 02  6.40[illegible]-04
 67    .6722   135.0  546.[illegible]  1.5965E 00  3.9[illegible]-01  5.3805E-04  2.1710E-03  1.30[illegible] 02  6.7[illegible]-04
 68    .7170   135.0  545.60  1.6256E 00  3.8282E-01  5.3722E-04  2.1675E-03  1.3084E 02  6.72[illegible]-04
 69    .7583   135.0  546.61  1.1994E 00  3.1652E-01  4.4[illegible]-04  1.8075E-03  1.3103E 02  5.51[illegible]-04
 70    .7996   135.0  549.95  1.9576E 00  4.[illegible]-01  7.5099E-04  3.[illegible]-03  1.3163E 02  9.5[illegible]-04
 71    .8409   135.0  550.12  2.2223E 00  6.[illegible]-01  8.6[illegible]-04  3.4841E-03  1.31[illegible] 02  1.0[illegible]-03
 72    .8822   135.0  551.14  2.6651E 00  [illegible]-01  1.0198E-03  4.1[illegible]-03  1.3215E 02  1.2[illegible]-03
 73    .9215   135.0  551.56  1.5[illegible] 00  8.1[illegible]-01  1.1493E-03  4.6[illegible]-03  1.3225E 02  1.4[illegible]-03
 74    .9648   135.0  551.09  1.7[illegible] 00  8.4208E-01  1.2563E-03  5.10[illegible]-03  1.3[illegible] 02  1.58[illegible]-03
 75    .2524   180.0  531.44  1.1643E 00  5.1254E-01  7.0520E-04  2.[illegible]-03  1.2[illegible] 02  8.82[illegible]-04
 76    .2943   180.0  531.29  4.1093E-01  2.9467E-01  4.1502E-04  1.[illegible]-03  1.2[illegible] 02  5.1[illegible]-04
 77    .3363   180.0  540.00  1.2941E 00  [illegible]-01  5.3254E-04  2.[illegible]-03  1.2[illegible] 02  6.6[illegible]-04
 78    .3783   180.0  541.1[illegible]  [illegible]2919E 00  3.[illegible]-01  5.4[illegible]-04  2.[illegible]-03  1.2[illegible] 02  6.7[illegible]-04
 79    .4203   180.0  542.94  1.1762E 00  4.0682E-01  5.6612E-04  2.2[illegible]-03  1.[illegible] 02  7.[illegible]-04
 80    .4623   180.0  544.14  1.1199E 00  3.7602E-01  5.2705E-04  2.1[illegible]-03  1.30[illegible] 02  6.5[illegible]-04
 81    .5043   180.0  545.61  1.3426E 00  3.1[illegible]-01  4.3686E-04  1.[illegible]-03  1.3[illegible] 02  5.[illegible]-04
 82    .5463   180.0  546.91  1.2540E 00  3.2230E-01  4.5326E-04  1.[illegible]-03  1.[illegible] 02  5.[illegible]-04
 83    .5882   180.0  547.97  1.1319E 00  3.0048E-01  4.2308E-04  1.70[illegible]-03  1.31[illegible] 02  5.29[illegible]-04
 84    .6302   180.0  539.61  -2.4946E-02  -7.6866E-03  -1.0697E-05  -4.3172E-05  1.29[illegible] 02  [illegible]-05
 85    .6722   180.0  550.77  1.8164E 00  3.6666E-01  5.[illegible]-04  2.[illegible]-03  1.3[illegible] 02  [illegible]-04
 86    .7170   180.0  551.05  1.6620E 00  3.9151E-01  5.[illegible]-04  2.[illegible]-03  1.3[illegible] 02  6.9[illegible]-04
 87    .7583   180.0  552.81  1.8649E 00  4.3310E-01  6.[illegible]-04  2.[illegible]-03  1.3255E 02  7.80[illegible]-04
 88    .7996   180.0  555.05  1.8290E 00  4.7867E-01  6.[illegible]-04  2.[illegible]-03  1.33[illegible] 02  8.47[illegible]-04
 89    .8409   180.0  556.1[illegible]  2.3766E 00  5.[illegible]-01  8.2[illegible]-04  3.3[illegible]-03  1.3336E 02  1.03[illegible]-03
 90    .8822   180.0  557.03  1.8024E 00  6.[illegible]-01  9.0673E-04  3.[illegible]-03  1.33[illegible] 02  1.1[illegible]-03
 91    .9235   180.0  558.71  1.6119E 00  8.[illegible]-01  1.2076E-03  4.[illegible]-03  1.3[illegible] 02  1.5[illegible]-03
 92    .9648   180.0  558.[illegible]  4.1010E 00  9.5504E-01  1.3[illegible]-03  5.4[illegible]-03  1.33[illegible] 02  1.69[illegible]-03
 93    .8822   225.0  557.81  2.9893E 00  8.6159E-01  9.4[illegible]-04  3.[illegible]-03  1.3[illegible] 02  1.1[illegible]-03
 94    .9648   225.0  562.[illegible]  1.6325E 00  9.7355E-01  1.2[illegible]-03  5.[illegible]-03  1.3[illegible] 02  1.50[illegible]-03
 95    .7170   270.0  [illegible]  1.7507E 00  3.9[illegible]-01  5.6684E-04  2.[illegible]-03  1.3[illegible] 02  7.05[illegible]-04
 96    .7996   270.0  [illegible]  1.6842E 00  4.4724E-01  6.3412E-04  2.[illegible]-03  1.3[illegible] 02  8.0[illegible]-04
 97    .9215   270.0  565.21  2.1812E 00  6.1449E-01  9.156[illegible]-04  3.[illegible]-03  1.3[illegible] 02  1.144[illegible]-03
 98    .9648   270.0  561.58  1.5146E 00  8.4544E-01  1.2[illegible]-03  4.8[illegible]-03  1.3[illegible] 02  1.51[illegible]-03
```


OF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
X/L
0.80

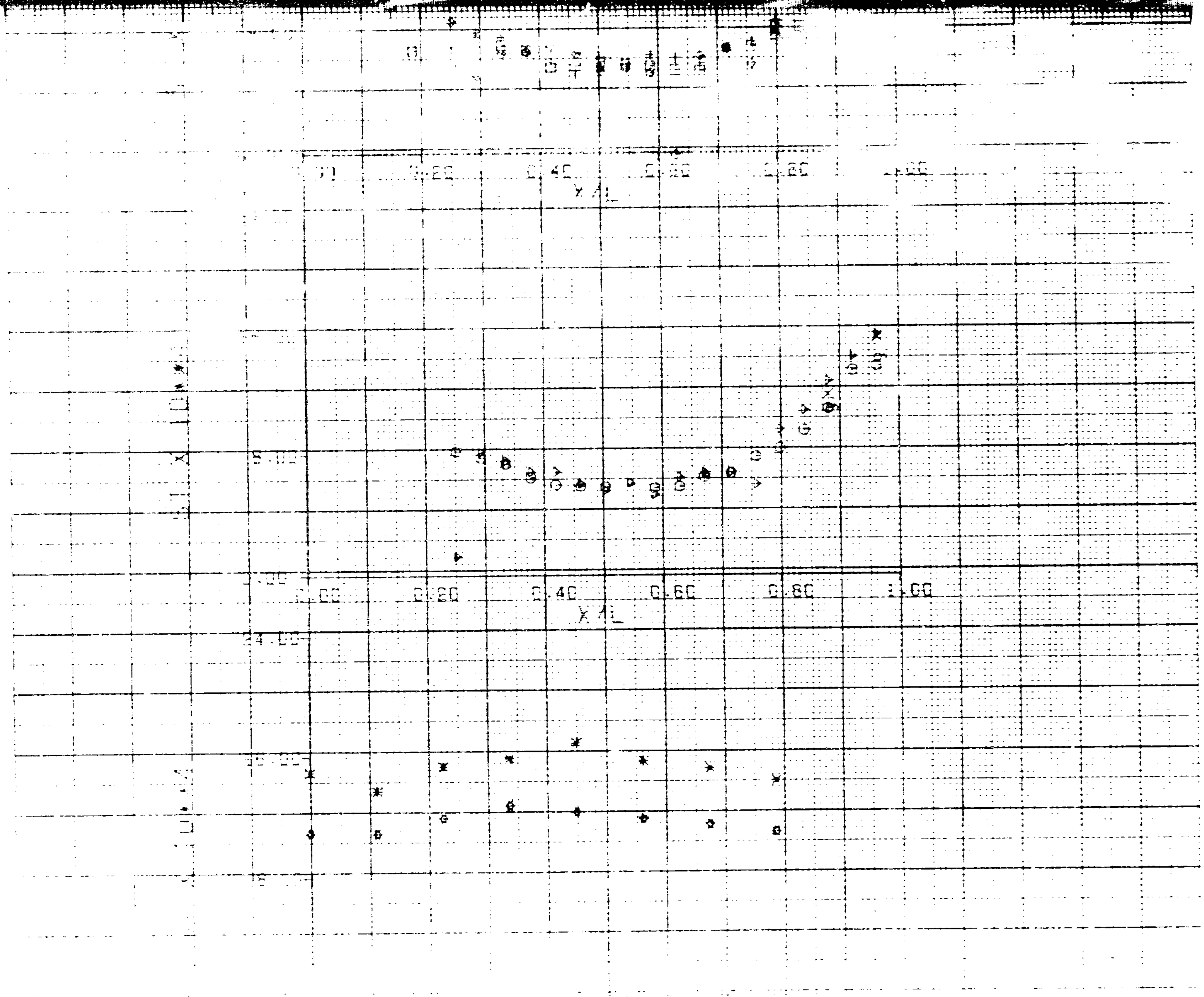


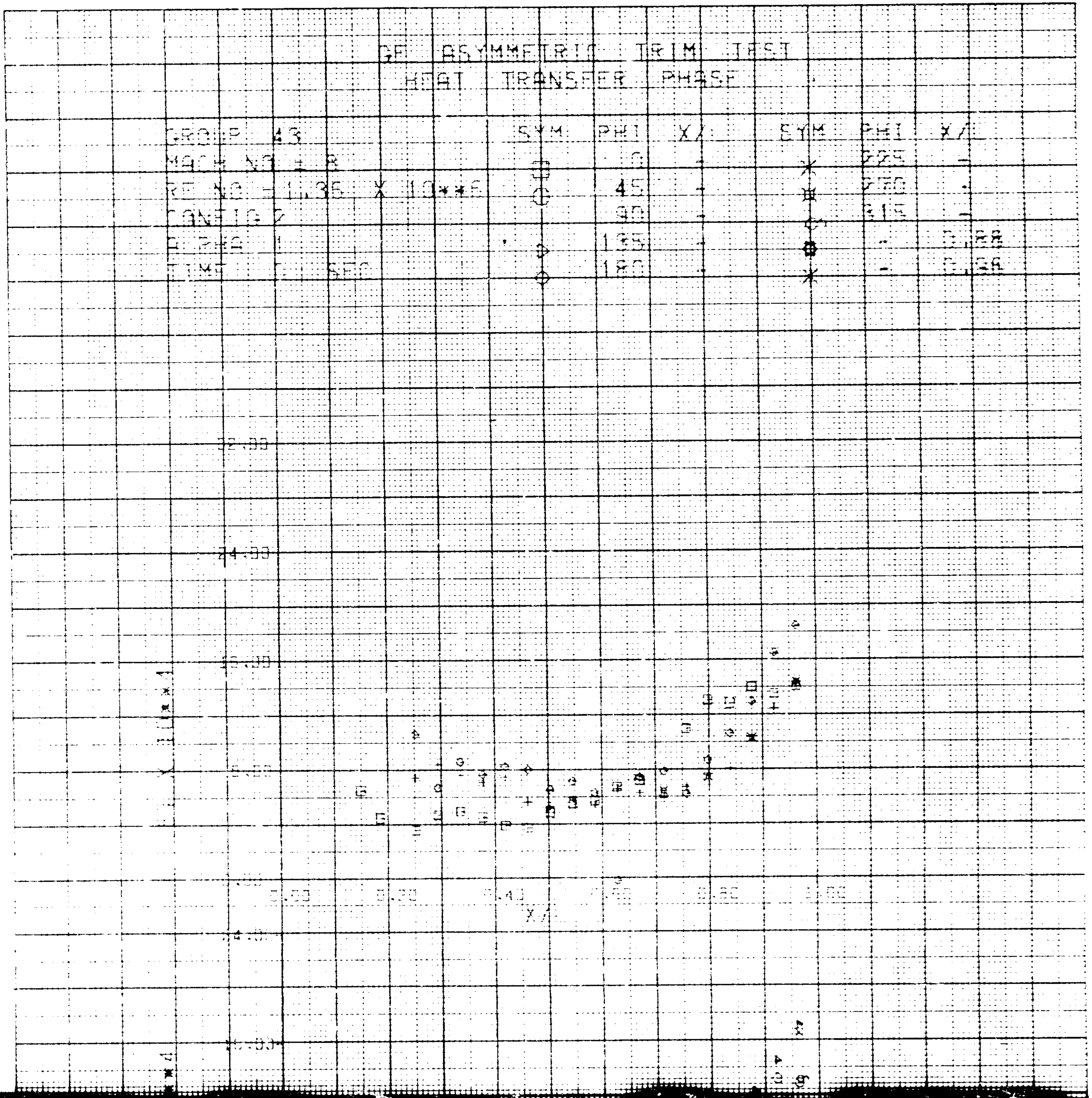
Figure [illegible]

```
                                   7/16/69

                     AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                       VON KARMAN GAS DYNAMICS FACILITY
                         50 INCH HYPERSONIC TUNNEL B
                                 VT0967-000
GROUP   CONFIG    ALPHA-M     BETA-M      ALPHA-S      ROLL   ALP-P  DATE    MACH NO       PO          TO        TIME
 43       2         1.03        0           1.07         0       0    715      7.97       281.90     1261.01     -.60
 T-INF        P-INF        Q-INF        V-INF        RHO-INF      MU-INF       RE/FT        RE/D         HO
9.4816E 01   2.9596E-02   1.3159E 00   3.7461E 03   2.0945E-05   7.4802E-08   1.3546E 06   1.2502E 06   3.6813E 02

TC NO   X/L    PHI     TEMP     SLOPE        Q-STON       HT           HH           HW           ST

  1    .1304     0    531.18   1.7007E 00   3.8274E-01   5.2463E-04   2.1173E-03   1.2740E 02   6.5095E-04
  2    .1667     0    532.11   1.1944E 00   2.6231E-01   3.5988E-04   1.4570E-03   1.2762E 02   4.4668E-04
  3    .2524     0    534.03   7.6900E-01   2.0811E-01   2.8627E-04   1.1545E-03   1.2808E 02   3.5527E-04
  4    .2943     0    536.31   8.5726E-01   2.7058E-01   3.7338E-04   1.5070E-03   1.2863E 02   4.6333E-04
  5    .3363     0    537.77   9.3752E-01   2.8643E-01   3.9605E-04   1.5944E-03   1.2897E 02   4.9142E-04
  6    .3783     0    539.08   8.7287E-01   2.6214E-01   3.6312E-04   1.4634E-03   1.2920E 02   4.5052E-04
  7    .4203     0    539.66   7.8036E-01   2.2674E-01   3.1431E-04   1.2643E-03   1.2941E 02   3.8995E-04
  8    .4623     0    540.62   7.9029E-01   2.1775E-01   3.0227E-04   1.2197E-03   1.2965E 02   3.7500E-04
  9    .5043     0    540.72   1.1295E 00   2.7025E-01   3.8630E-04   1.5580E-03   1.2967E 02   4.7925E-04
 10    .5463     0    542.67   1.1210E 00   3.1453E-01   4.3781E-04   1.7647E-03   1.3014E 02   5.4316E-04
 11    .5882     0    543.69   1.2047E 00   3.3192E-01   4.6273E-04   1.8649E-03   1.3038E 02   5.7397E-04
 12    .6302     0    544.61   1.4257E 00   3.8570E-01   5.3860E-04   2.1721E-03   1.3060E 02   6.6780E-04
 13    .6722     0    545.82   1.6531E 00   4.1416E-01   5.7907E-04   2.3360E-03   1.3089E 02   7.1819E-04
 99    .8822   315.0  553.07   2.4339E 00   6.3402E-01   8.9554E-04   3.6112E-03   1.3261E 02   1.1103E-03
 15    .7563     0    548.74   2.6217E 00   6.3094E-01   8.8587E-04   3.5730E-03   1.3159E 02   1.0985E-03
 16    .7996     0    550.24   2.4630E 00   7.4717E-01   1.0512E-03   4.2390E-03   1.3194E 02   1.3035E-03
 17    .8409     0    550.50   2.4755E 00   7.3473E-01   1.0341E-03   4.1705E-03   1.3200E 02   1.2822E-03
 18    .8822     0    550.09   3.2017E 00   8.0210E-01   1.1295E-03   4.5563E-03   1.3210E 02   1.4005E-03
 19    .9235     0    550.82   3.0904E 00   7.7420E-01   1.0889E-03   4.3917E-03   1.3189E 02   1.3502E-03
 20    .9648     0    551.24   3.3437E 00   8.0408E-01   1.1324E-03   4.5680E-03   1.3218E 02   1.4047E-03
 21    .2524   45.0   532.19   1.1712E 00   4.0533E-01   5.5615E-04   2.2452E-03   1.2764E 02   6.9028E-04
 22    .2943   45.0   534.76   1.4689E 00   4.7095E-01   6.4846E-04   2.6175E-03   1.2825E 02   8.0474E-04
 23    .3363   45.0   536.40   1.7341E 00   3.7096E-01   5.1210E-04   2.0648E-03   1.2869E 02   6.3545E-04
 24    .3783   45.0   538.71   1.1526E 00   3.4647E-01   4.7968E-04   1.9350E-03   1.2919E 02   5.9516E-04
 25    .4203   45.0   539.75   1.0685E 00   3.1047E-01   4.3046E-04   1.7371E-03   1.2944E 02   5.3406E-04
 26    .4623   45.0   542.31   1.0785E 00   3.0260E-01   4.2105E-04   1.6988E-03   1.3006E 02   5.2231E-04
 27    .5043   45.0   543.37   1.0605E 00   2.8161E-01   3.9242E-04   1.5832E-03   1.3030E 02   4.8676E-04
100    .9648  315.0   556.35   1.1478E 00   7.5699E-01   1.0743E-03   4.3311E-03   1.3340E 02   1.3316E-03
 29    .5882   45.0   545.26   1.0282E 00   2.8331E-01   3.9582E-04   1.5948E-03   1.3075E 02   4.9094E-04
 30    .6302   45.0   546.38   1.1394E 00   3.0826E-01   4.3136E-04   1.7400E-03   1.3102E 02   5.3498E-04
 31    .6722   45.0   548.37   1.1719E 00   3.3676E-01   4.7268E-04   1.9065E-03   1.3154E 02   5.8616E-04
 32    .7170   45.0   550.14   1.5434E 00   3.6345E-01   5.1128E-04   2.0620E-03   1.3192E 02   6.3397E-04
 33    .7563   45.0   550.81   1.5773E 00   4.3459E-01   6.1194E-04   2.4679E-03   1.3208E 02   7.5875E-04
 34    .7996   45.0   552.15   1.8407E 00   5.1645E-01   7.2857E-04   2.9380E-03   1.3240E 02   9.0330E-04
 35    .8409   45.0   553.34   2.1175E 00   5.7207E-01   8.0955E-04   3.2644E-03   1.3268E 02   1.0036E-03
 36    .8822   45.0   553.64   2.5100E 00   6.6020E-01   9.3338E-04   3.7636E-03   1.3276E 02   1.1571E-03
 37    .9235   45.0   55 .98   2.9683E 00   7.5844E-01   1.0712E-03   4.3195E-03   1.3259E 02   1.3280E-03
 38    .9648   45.0   554.83   3.0756E 00   7.3962E-01   1.0473E-03   4.2224E-03   1.3303E 02   1.2983E-03
 39    .2524   90.0   536.43   1.4401E 00   4.3753E-01   6.0384E-04   2.4372E-03   1.2865E 02   7.4930E-04
 40    .2943   90.0   538.71   1.5406E 00   4.9395E-01   6.8386E-04   2.7590E-03   1.2920E 02   8.4849E-04
 41    .3363   90.0   539.99   1.4145E 00   4.4644E-01   6.1919E-04   2.4988E-03   1.2950E 02   7.6820E-04
 42    .3783   90.0   541.29   1.3128E 00   4.1638E-01   5.7570E-04   2.3230E-03   1.2980E 02   7.1420E-04
 43    .4203   90.0   542.60   1.4723E 00   4.3523E-01   6.0583E-04   2.4444E-03   1.3012E 02   7.5152E-04
 44    .4623   90.0   542.91   1.0689E 00   3.3204E-01   4.6238E-04   1.8656E-03   1.3019E 02   5.7357E-04
 45    .5043   90.0   544.17   1.1293E 00   3.1116E-01   4.3405E-04   1.7511E-03   1.3048E 02   5.3938E-04
 46    .5463   90.0   544.14   1.2136E 00   3.4658E-01   4.8347E-04   1.9505E-03   1.3049E 02   5.9968E-04
 47    .5882   90.0   546.22   1.1176E 00   3.1358E-01   4.3871E-04   1.7697E-03   1.3098E 02   5.4410E-04
 48    .6302   90.0   547.01   1.3835E 00   3.8118E-01   5.3387E-04   2.1535E-03   1.3117E 02   6.6209E-04
 49    .6722   90.0   547.68   1.4567E 00   3.6494E-01   5.1160E-04   2.0636E-03   1.3133E 02   6.3445E-04
 50    .7170   90.0   549.84   1.4584E 00   3.4345E-01   4.8294E-04   1.9477E-03   1.3185E 02   5.9883E-04
 51    .7563   90.0   548.21   1.4874E 00   3.8748E-01   5.4360E-04   2.1970E-03   1.3146E 02   6.7412E-04
 52    .7996   90.0   549.01   1.7050E 00   4.4415E-01   6.2436E-04   2.5181E-03   1.3179E 02   7.7419E-04
 53    .8409   90.0   549.21   1.8619E 00   4.6646E-01   6.5531E-04   2.6430E-03   1.3170E 02   8.1260E-04
 54    .8822   90.0   550.01   2.4423E 00   5.9951E-01   8.4320E-04   3.4087E-03   1.3189E 02   1.0455E-03
 55    .9235   90.0   549.56   2.0864E 00   7.1817E-01   1.0095E-03   4.0718E-03   1.3178E 02   1.2517E-03
 56    .9648   90.0   551.06   3.1900E 00   8.1522E-01   1.1483E-03   4.6309E-03   1.3214E 02   1.4238E-03
 57    .2524  135.0   532.22   3.2796E-01   9.6948E-02   1.3303E-04   5.3703E-04   1.2765E 02   1.6511E-04
 58    .2943  135.0   534.39   1.8014E 00   5.7755E-01   7.9484E-04   3.2084E-03   1.2816E 02   9.8643E-04
 59    .3363  135.0   535.24   1.7005E 00   5.3674E-01   7.3960E-04   2.9853E-03   1.2838E 02   9.1782E-04
 60    .3783  135.0   536.04   1.5451E 00   4.7996E-01   6.6022E-04   2.6650E-03   1.2808E 02   8.1937E-04
 61    .4203  135.0   537.02   1.5503E 00   4.6603E-01   6.4370E-04   2.5979E-03   1.2879E 02   7.9874E-04
 62    .4623  135.0   538.15   1.4322E 00   4.1615E-01   5.7570E-04   2.3234E-03   1.2906E 02   7.1432E-04
 63    .5043  135.0   539.28   1.4370E 00   3.9293E-01   5.4443E-04   2.1970E-03   1.2933E 02   6.7547E-04
 64    .5463  135.0   540.08   1.4746E 00   3.9150E-01   5.4316E-04   2.1918E-03   1.2952E 02   6.7387E-04
 65    .5882  135.0   541.09   1.4367E 00   3.8151E-01   5.2995E-04   2.1384E-03   1.2976E 02   6.5746E-04
 66    .6302  135.0   541.72   1.6669E 00   4.1608E-01   5.7847E-04   2.3341E-03   1.2991E 02   7.1761E-04
 67    .6722  135.0   544.00   1.4422E 00   3.9491E-01   5.5077E-04   2.2220E-03   1.3045E 02   6.8317E-04
 68    .7170  135.0   545.23   1.7276E 00   4.0603E-01   5.6837E-04   2.2929E-03   1.3075E 02   7.0495E-04
 69    .7563  135.0   543.89   1.2980E 00   3.6195E-01   5.0474E-04   2.0363E-03   1.3043E 02   6.2607E-04
 70    .7996  135.0   546.78   1.9958E 00   5.7990E-01   8.1193E-04   3.2752E-03   1.3112E 02   1.0070E-03
 71    .8409  135.0   548.03   2.6325E 00   5.6003E-01   7.8547E-04   3.1682E-03   1.3141E 02   9.7407E-04
 72    .8822  135.0   549.12   2.6280E 00   7.1098E-01   9.9873E-04   4.0282E-03   1.3167E 02   1.2385E-03
 73    .9235  135.0   556.04   1.4045E 00   8.3571E-01   1.1755E-03   4.7410E-03   1.3190E 02   1.4576E-03
 74    .9648  135.0   550.79   4.0995E 00   9.8580E-01   1.3881E-03   5.5982E-03   1.3207E 02   1.7212E-03
 75    .2524  180.0   534.63   2.1541E 00   6.2589E-01   8.6166E-04   3.4781E-03   1.2822E 02   1.0693E-03
 76    .2943  180.0   538.05   1.2260E 00   3.9309E-01   5.4372E-04   2.1943E-03   1.2904E 02   6.7464E-04
 77    .3363  180.0   538.95   1.7014E 00   5.0295E-01   6.9655E-04   2.8110E-03   1.2925E 02   8.6423E-04
 78    .3783  180.0   540.27   1.4907E 00   4.4809E-01   6.2172E-04   2.5088E-03   1.2957E 02   7.7132E-04
 79    .4203  180.0   542.15   1.6358E 00   4.8356E-01   6.7268E-04   2.7141E-03   1.3001E 02   8.3446E-04
 80    .4623  180.0   543.67   1.6390E 00   4.6806E-01   6.5250E-04   2.6325E-03   1.3038E 02   8.0936E-04
 81    .5043  180.0   544.84   1.5167E 00   3.7997E-01   5.3056E-04   2.1404E-03   1.3065E 02   6.5806E-04
 82    .5463  180.0   545.98   1.5642E 00   4.1534E-01   5.8093E-04   2.3435E-03   1.3093E 02   7.2050E-04
 83    .5882  180.0   546.86   1.1709E 00   3.6405E-01   5.0977E-04   2.0543E-03   1.3114E 02   6.3221E-04
 84    .6302  180.0   540.18  -1.1561E-02  -8.9122E-03  -1.2364E-05  -4.9842E-05   1.2954E 02  -1.5339E-05
 85    .6722  180.0   550.43   1.7825E 00   4.2865E-01   6.0324E-04   2.4329E-03   1.3199E 02   7.4798E-04
 86    .7170  180.0   551.39   1.0288E 00   4.5421E-01   6.4008E-04   2.5813E-03   1.3222E 02   7.9362E-04
 87    .7563  180.0   551.10   1.4896E 00   3.5822E-01   5.0461E-04   2.0350E-03   1.3215E 02   6.2566E-04
 88    .7996  180.0   553.11   1.9098E 00   4.9750E-01   7.0279E-04   2.8339E-03   1.3263E 02   8.7130E-04
 89    .8409  180.0   554.22   2.3853E 00   6.0940E-01   8.6229E-04   3.4769E-03   1.3289E 02   1.0690E-03
 90    .8822  180.0   555.40   1.2184E 00   7.4164E-01   1.0511E-03   4.2379E-03   1.3317E 02   1.3029E-03
 91    .9235  180.0   556.14   1.8449E 00   9.4380E-01   1.3391E-03   5.3967E-03   1.3336E 02   1.6598E-03
 [illegible] .9648  180.0   557.74   4.4701E 00   1.0531E 00   1.4975E-03   6.0370E-03   1.3373E 02   1.8561E-03
 [illegible] .8822  225.0   556.94   2.3149E 00   6.6813E-01   9.4896E-04   3.8250E-03   1.3354E 02   1.1762E-03
 [illegible] .9648  225.0   557.88   1.1183E 00   9.4226E-01   1.3401E-03   5.4025E-03   1.3376E 02   1.6610E-03
 [illegible] [illegible]  270.0   554.71   1.4337E 00   3.6033E-01   5.2149E-04   2.1027E-03   1.3302E 02   6.4667E-04
 [illegible] [illegible]  270.0   556.26   1.1873E 00   4.2152E-01   5.9980E-04   2.4180E-03   1.3338E 02   7.4360E-04
 [illegible] .8822  270.0   558.81   2.9995E 00   5.8755E-01   8.3675E-04   3.3731E-03   1.3399E 02   1.0371E-03
 [illegible] .9648  270.0   558.34   1.4119E 00   8.2049E-01   1.1677E-03   4.7072E-03   1.3387E 02   1.4472E-03
```

OF ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

GROUP 43   SYM. PHI X/L   SYM. PHI X/L   SYM PHI X/L


GA ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 43
MACH NO = 8
RE NO = 1.35 X 10**6
CONFIG 2
ALPHA 1
TIME T SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96
32.00
24.00
16.00
8.00
0.00
-8.00
-16.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
Y (10**4)

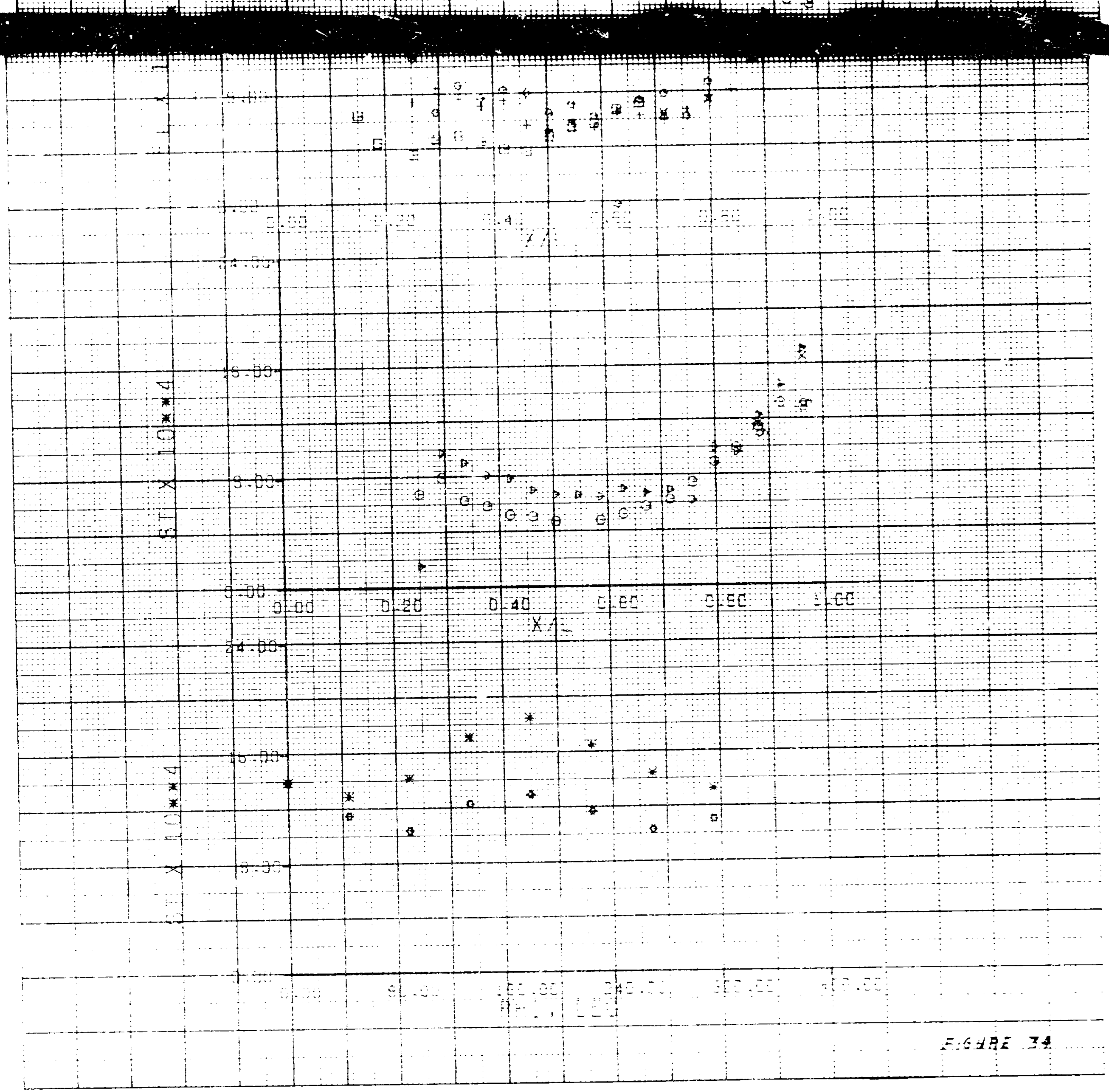

ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L
8.00
16.00
24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L
FIGURE 34

Figure 34

7/14/69

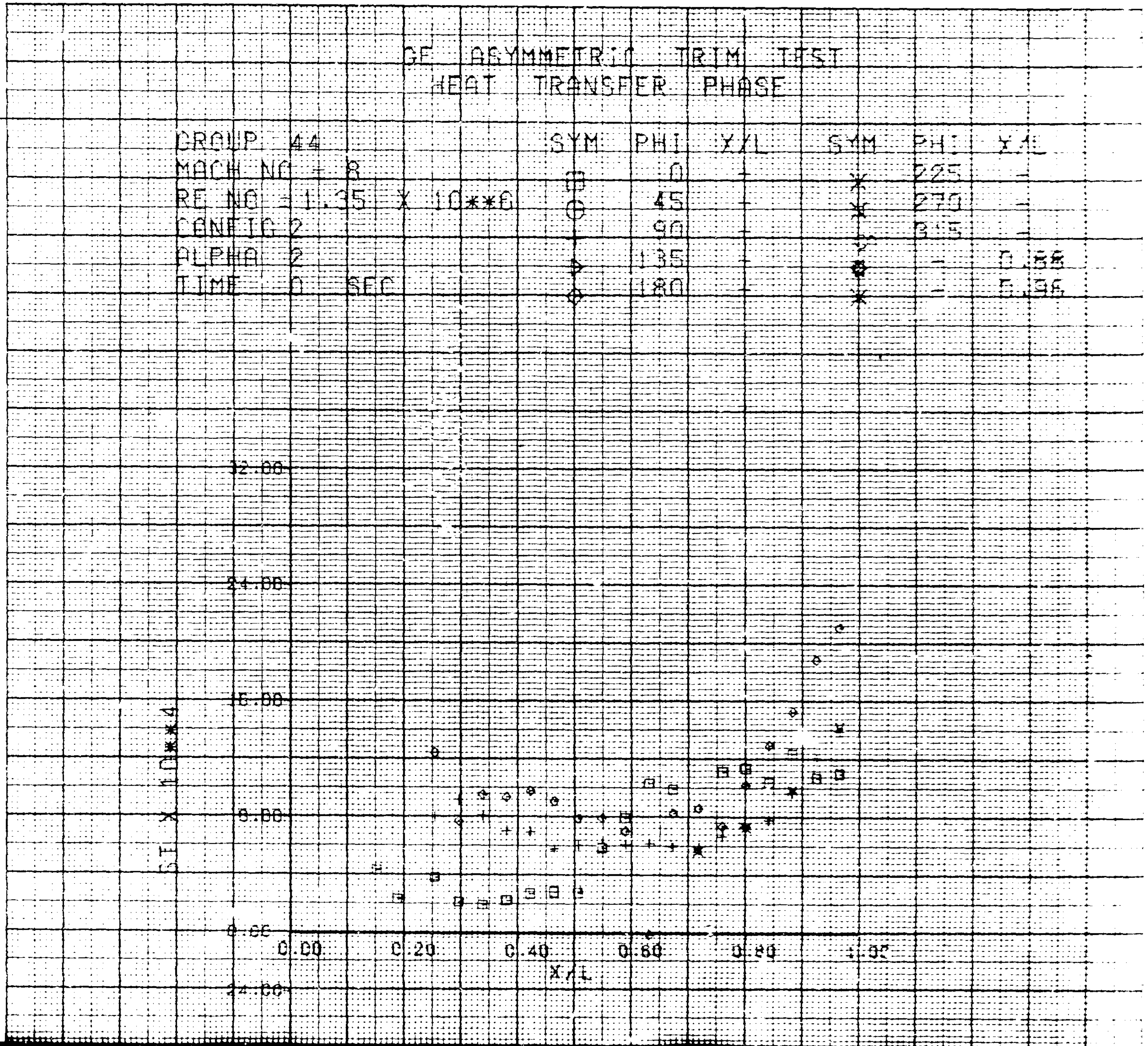
AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT09A7-H00

GROUP	CONFIG	ALPHA-N	BETA-N	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
44	2	2.00	.00	7.00	-.02	0	719	7.97	280.06	1340.02	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.2500E 01	2.9480E-02	1.3198E 00	3.7577E 03	2.8714E-05	7.5541E-08	1.3447E 06	1.2350E 06	3.1818E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOW	HT	HH	HO	ST
1	.1509	0	521.31	1.5593E 00	7.8504E-01	3.9450E-04	1.6317E-03	1.2588E 02	4.4326E-04
2	.1867	0	525.77	6.5979E-01	1.4497E-01	1.9501E-04	7.4719E-04	1.2612E 02	2.4772E-04
3	.2524	0	528.06	7.8443E-01	2.3149E-01	3.1138E-04	1.2644E-03	1.2645E 02	3.9159E-04
4	.2943	0	529.78	6.1931E-01	1.3235E-01	1.7908E-04	7.2275E-04	1.2707E 02	2.2377E-04
5	.3363	0	531.45	5.5281E-01	1.2663E-01	1.6386E-04	6.6125E-04	1.2747E 02	2.0473E-04
6	.3783	0	533.08	6.6724E-01	1.4947E-01	1.9090E-04	7.7010E-04	1.2783E 02	2.3849E-04
7	.4203	0	533.96	6.4810E-01	1.6507E-01	2.2442E-04	9.0612E-04	1.2806E 02	2.4060E-04
8	.4623	0	535.40	6.2071E-01	1.7270E-01	2.3547E-04	9.5001E-04	1.2841E 02	2.9413E-04
9	.5043	0	536.12	6.1492E-01	1.6636E-01	2.2705E-04	9.1603E-04	1.2854E 02	2.8361E-04
10	.5463	0	538.69	1.2371E 00	3.4711E-01	4.7540E-04	1.9177E-03	1.2919E 02	5.9374E-04
11	.5882	0	540.84	1.5024E 00	4.6920E-01	6.4453E-04	2.5997E-03	1.2970E 02	8.0518E-04
12	.6302	0	543.24	2.2512E 00	6.0633E-01	8.3365E-04	3.3701E-03	1.3027E 02	1.0534E-03
13	.6722	0	545.94	2.3105E 00	5.7802E-01	8.0072E-04	3.2287E-03	1.3092E 02	9.9965E-04
99	.8022	315.0	555.32	2.4177E 00	7.3942E-01	1.0268E-03	4.1601E-03	1.3315E 02	1.2837E-03
15	.7583	0	549.26	2.4990E 00	6.[illegible]E-01	9.0201E-04	3.6365E-03	1.3171E 02	1.1259E-03
16	.7996	0	550.78	2.1574E 00	6.6153E-01	9.2116E-04	3.7134E-03	1.3207E 02	1.1497E-03
17	.8409	0	551.30	2.3694E 00	6.0540E-01	8.4376E-04	3.4012E-03	1.3219E 02	1.0530E-03
18	.8822	0	551.94	2.8453E 00	7.1785E-01	1.0013E-03	4.0363E-03	1.3235E 02	1.2497E-03
19	.9235	0	551.27	2.4703E 00	6.2386E-01	8.6938E-04	3.5046E-03	1.3218E 02	1.0851E-03
20	.9648	0	549.92	2.4624E 00	6.4025E-01	8.9059E-04	3.5903E-03	1.3186E 02	1.1116E-03
21	.2524	45.0	526.24	1.4627E 00	4.3240E-01	5.8231E-04	2.3504E-03	1.2623E 02	7.2776E-04
22	.2943	45.0	526.73	1.2569E 00	4.0299E-01	5.4304E-04	2.1920E-03	1.2634E 02	6.7866E-04
23	.3363	45.0	528.72	1.2145E 00	3.6509E-01	4.9330E-04	1.9910E-03	1.2682E 02	6.1643E-04
24	.3783	45.0	530.21	1.0712E 00	3.2201E-01	4.3599E-04	1.7595E-03	1.2710E 02	5.4476E-04
25	.4203	45.0	532.80	9.1630E-01	2.6450E-01	3.5936E-04	1.4501E-03	1.2779E 02	4.4896E-04
26	.4623	45.0	535.72	1.0456E 00	2.9337E-01	4.0018E-04	1.6145E-03	1.2848E 02	4.9987E-04
27	.5043	45.0	537.17	9.5423E-01	2.5340E-01	3.4634E-04	1.3972E-03	1.2883E 02	4.3258E-04
100	.9648	315.0	555.31	3.0637E 00	7.3675E-01	1.0323E-03	4.1604E-03	1.3310E 02	1.2881E-03
29	.5882	45.0	540.24	1.0046E 00	2.7679E-01	3.7990E-04	1.5323E-03	1.2956E 02	4.7443E-04
30	.6302	45.0	542.26	1.2207E 00	3.3025E-01	4.5454E-04	1.8332E-03	1.3004E 02	5.6758E-04
31	.6722	45.0	547.04	1.6543E 00	4.0609E-01	5.6263E-04	2.2645E-03	1.3118E 02	7.0236E-04
32	.7170	45.0	549.09	1.9910E 00	4.6887E-01	6.5165E-04	2.6264E-03	1.3167E 02	8.1315E-04
33	.7583	45.0	548.39	2.0562E 00	5.6656E-01	7.8642E-04	3.1706E-03	1.3150E 02	9.8166E-04
34	.7996	45.0	549.94	2.3756E 00	6.6656E-01	9.2723E-04	3.7380E-03	1.3187E 02	1.1573E-03
35	.8409	45.0	551.90	2.6367E 00	7.1333E-01	9.9485E-04	4.0102E-03	1.3231E 02	1.2416E-03
36	.8822	45.0	552.32	2.8490E 00	7.4957E-01	1.0462E-03	4.2169E-03	1.3244E 02	1.3056E-03
37	.9235	45.0	552.04	2.9858E 00	7.6290E-01	1.0644E-03	4.2906E-03	1.3238E 02	1.3284E-03
38	.9648	45.0	553.07	2.8659E 00	7.1323E-01	9.9649E-04	4.0165E-03	1.3262E 02	1.2436E-03
39	.2524	90.0	528.58	1.6331E 00	4.8275E-01	6.5216E-04	2.6322E-03	1.2678E 02	8.1495E-04
40	.2943	90.0	528.99	1.7247E 00	5.5299E-01	7.4742E-04	3.0166E-03	1.2687E 02	9.3396E-04
41	.3363	90.0	530.53	1.5344E 00	4.8431E-01	6.5600E-04	2.6474E-03	1.2725E 02	8.1966E-04
42	.3783	90.0	532.72	1.3370E 00	4.2200E-01	5.7329E-04	2.3133E-03	1.2777E 02	7.1623E-04
43	.4203	90.0	534.90	1.4095E 00	4.1667E-01	5.6773E-04	2.2906E-03	1.2829E 02	7.0919E-04
44	.4623	90.0	535.72	1.1141E 00	3.4607E-01	4.7207E-04	1.9046E-03	1.2848E 02	5.8967E-04
45	.5043	90.0	537.09	1.1016E 00	3.5847E-01	4.8984E-04	1.9763E-03	1.2881E 02	6.1189E-04
46	.5463	90.0	539.29	1.2865E 00	3.6740E-01	5.0361E-04	2.0314E-03	1.2933E 02	6.2895E-04
47	.5882	90.0	540.09	1.2928E 00	3.6274E-01	4.9777E-04	2.0078E-03	1.2952E 02	6.2163E-04
48	.6302	90.0	541.01	1.3280E 00	3.6590E-01	5.0274E-04	2.0277E-03	1.2974E 02	6.2780E-04
49	.6722	90.0	545.59	1.3995E 00	3.5661E-01	4.3479E-04	1.9648E-03	1.3083E 02	6.0524E-04
50	.7170	90.0	547.68	1.4821E 00	3.4902E-01	4.8399E-04	1.9514E-03	1.3133E 02	6.0417E-04
51	.7583	90.0	543.72	1.5062E 00	3.9235E-01	5.4110E-04	2.1821E-03	1.3039E 02	6.7561E-04
52	.7996	90.0	544.90	1.6599E 00	4.3240E-01	5.9730E-04	2.4086E-03	1.3067E 02	7.4573E-04
53	.8409	90.0	545.52	1.8265E 00	4.5758E-01	6.3263E-04	2.5510E-03	1.3082E 02	7.8982E-04
54	.8822	90.0	546.59	2.2982E 00	5.6413E-01	7.8110E-04	3.1495E-03	1.3107E 02	9.7511E-04
55	.9235	90.0	546.70	2.9299E 00	7.0459E-01	9.7572E-04	3.9342E-03	1.3110E 02	1.2181E-03
56	.9648	90.0	548.78	3.3689E 00	8.1315E-01	1.1251E-03	4.5361E-03	1.3159E 02	1.4044E-03
57	.2524	135.0	523.82	4.0223E-01	1.1890E-01	1.5960E-04	6.4434E-04	1.2565E 02	1.9949E-04
58	.2943	135.0	523.82	2.0836E 00	6.6806E-01	8.9673E-04	3.6202E-03	1.2565E 02	1.1209E-03
59	.3363	135.0	525.31	2.0080E 00	6.3380E-01	8.5245E-04	3.4412E-03	1.2601E 02	1.0654E-03
60	.3783	135.0	525.10	1.7279E 00	5.3676E-01	7.2173E-04	2.9135E-03	1.2596E 02	9.0205E-04
61	.4203	135.0	528.44	1.7988E 00	5.4071E-01	7.3032E-04	2.9476E-03	1.2675E 02	9.1262E-04
62	.4623	135.0	530.20	1.5720E 00	4.5677E-01	6.1841E-04	2.4957E-03	1.2717E 02	7.7270E-04
63	.5043	135.0	531.88	1.7390E 00	4.4434E-01	6.0296E-04	2.4332E-03	1.2757E 02	7.5333E-04
64	.5463	135.0	533.17	1.4888E 00	4.4846E-01	6.0962E-04	2.4599E-03	1.2788E 02	7.6160E-04
65	.5882	135.0	534.67	1.6654E 00	4.3694E-01	5.9517E-04	2.4013E-03	1.2823E 02	7.4348E-04
66	.6302	135.0	536.05	1.6518E 00	4.4183E-01	6.0296E-04	2.4326E-03	1.2856E 02	7.5315E-04
67	.6722	135.0	541.84	1.9333E 00	4.6491E-01	6.3951E-04	2.5793E-03	1.2996E 02	7.9856E-04
68	.7170	135.0	542.91	1.8812E 00	4.4301E-01	6.1028E-04	2.4612E-03	1.3019E 02	7.6202E-04
69	.7583	135.0	539.81	1.4124E 00	3.9628E-01	5.4359E-04	2.1926E-03	1.2946E 02	6.7886E-04
70	.7996	135.0	541.98	2.4406E 00	5.9292E-01	8.1576E-04	3.2901E-03	1.2997E 02	1.0186E-03
71	.8409	135.0	544.11	2.7185E 00	7.4904E-01	1.0336E-03	4.1680E-03	1.3048E 02	1.2905E-03
72	.8822	135.0	544.84	2.9247E 00	7.9259E-01	1.0948E-03	4.4147E-03	1.3065E 02	1.3668E-03
73	.9235	135.0	545.95	3.7574E 00	9.2233E-01	1.2759E-03	5.1449E-03	1.3092E 02	1.5929E-03
74	.9648	135.0	549.94	4.4710E 00	1.0752E 00	1.4957E-03	6.0296E-03	1.3188E 02	1.8669E-03
75	.2524	180.0	526.20	2.5626E 00	7.4459E-01	1.0027E-03	4.0473E-03	1.2622E 02	1.2531E-03
76	.2943	180.0	527.41	1.4418E 00	4.6226E-01	6.2352E-04	2.5167E-03	1.2651E 02	7.7920E-04
77	.3363	180.0	529.90	1.9321E 00	5.7115E-01	7.7304E-04	3.1196E-03	1.2712E 02	9.6593E-04
78	.3783	180.0	532.11	1.8632E 00	5.6008E-01	7.6025E-04	3.0678E-03	1.2762E 02	9.4983E-04
79	.4203	180.0	534.57	1.9695E 00	5.8221E-01	7.9293E-04	3.1903E-03	1.2821E 02	9.9054E-04
80	.4623	180.0	536.40	1.9685E 00	5.3929E-01	7.3632E-04	2.9706E-03	1.2864E 02	9.1972E-04
81	.5043	180.0	538.60	1.4570E 00	4.6522E-01	6.3710E-04	2.5700E-03	1.2917E 02	7.9569E-04
82	.5463	180.0	540.51	1.7589E 00	4.6787E-01	6.4133E-04	2.5868E-03	1.2963E 02	8.0089E-04
83	.5882	180.0	542.32	1.5628E 00	4.1501E-01	5.7125E-04	2.3039E-03	1.3005E 02	7.1331E-04
84	.6302	180.0	540.39	-5.7872E-03	-1.5368E-03	-2.1097E-06	-8.5096E-06	1.2959E 02	-2.6346E-06
85	.6722	180.0	549.21	2.8059E 00	4.8238E-01	6.7034E-04	2.7025E-03	1.3170E 02	8.3673E-04
86	.7170	180.0	550.21	2.1335E 00	5.0241E-01	6.9916E-04	2.8186E-03	1.3194E 02	8.7265E-04
87	.7583	180.0	548.78	1.7856E 00	4.2935E-01	5.9623E-04	2.4038E-03	1.3157E 02	7.4424E-04
88	.7996	180.0	550.81	2.7614E 00	5.9431E-01	8.2775E-04	3.3368E-03	1.3208E 02	1.0331E-03
89	.8409	180.0	552.51	2.9415E 00	7.5158E-01	1.0493E-03	4.2295E-03	1.3249E 02	1.3095E-03
90	.8822	180.0	554.39	3.4323E 00	8.8311E-01	1.2361E-03	4.9820E-03	1.3293E 02	1.5425E-03
91	.9235	180.0	556.46	4.4147E 00	1.0837E 00	1.5212E-03	6.1306E-03	1.3342E 02	1.8981E-03
92	.9648	180.0	557.01	5.2497E 00	1.2098E 00	1.6996E-03	6.8491E-03	1.3356E 02	2.1206E-03
93	.8822	225.0	557.52	2.8846E 00	7.3705E-01	1.0362E-03	4.1756E-03	1.3368E 02	1.2928E-03
94	.9648	225.0	557.58	4.2468E 00	1.0213E 00	1.4359E-03	5.7864E-03	1.3369E 02	1.7915E-03
95	.7170	270.0	554.84	1.4541E 00	3.2782E-01	4.5863E-04	1.8485E-03	1.3295E 02	5.7232E-04
96	.7996	270.0	556.19	1.6821E 00	4.2012E-01	5.8953E-04	2.3758E-03	1.3336E 02	7.3558E-04
97	.8822	270.0	559.54	2.9148E 00	5.6569E-01	7.9760E-04	3.2137E-03	1.3417E 02	9.9501E-04
98	.9648	270.0	557.42	3.4066E 00	8.1922E-01	1.1516E-03	4.6406E-03	1.3365E 02	1.4368E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM. PHI XXL SYM. PHI
GROUP 44

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 44
MACH NO = 8
RE NO = 1.35 X 10**6
CONFIG 2
ALPHA 2
TIME 0 SEC
SYM PHI X/L
□ 0 -
○ 45 -
+ 90 -
▷ 135 -
◇ 180 -
SYM PHI X/L
✶ 225 -
✶ 270 -
✶ 315 -
✶ - 0.56
✶ - 0.96
32.00
24.00
16.00
8.00
0.00
-24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

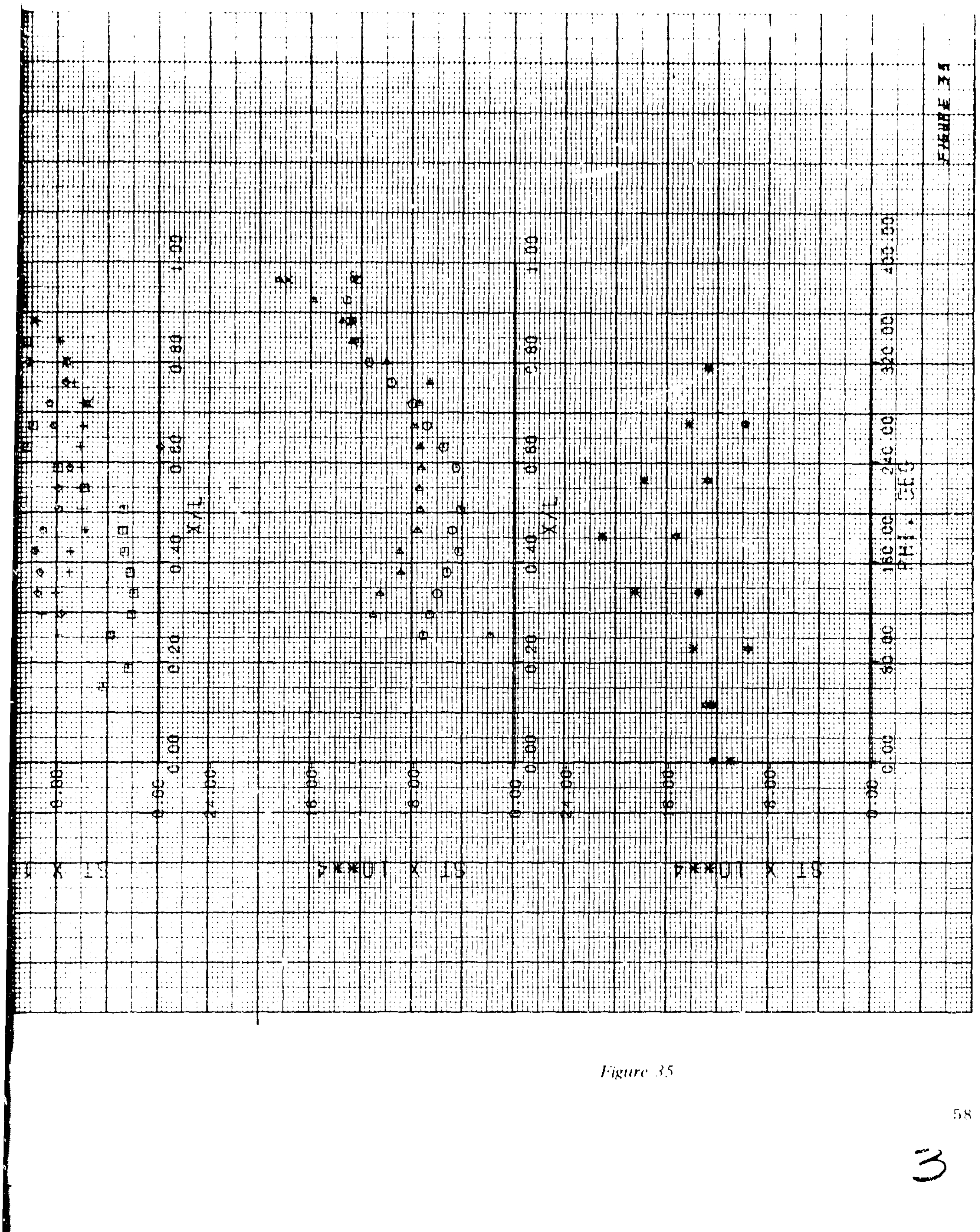


FIGURE 35
ST X 10**4
X/L
PHI, DEG
0.00
0.20
0.40
0.60
0.80
1.00
8.00
16.00
24.00
80.00
160.00
240.00
320.00
400.00

Figure 35

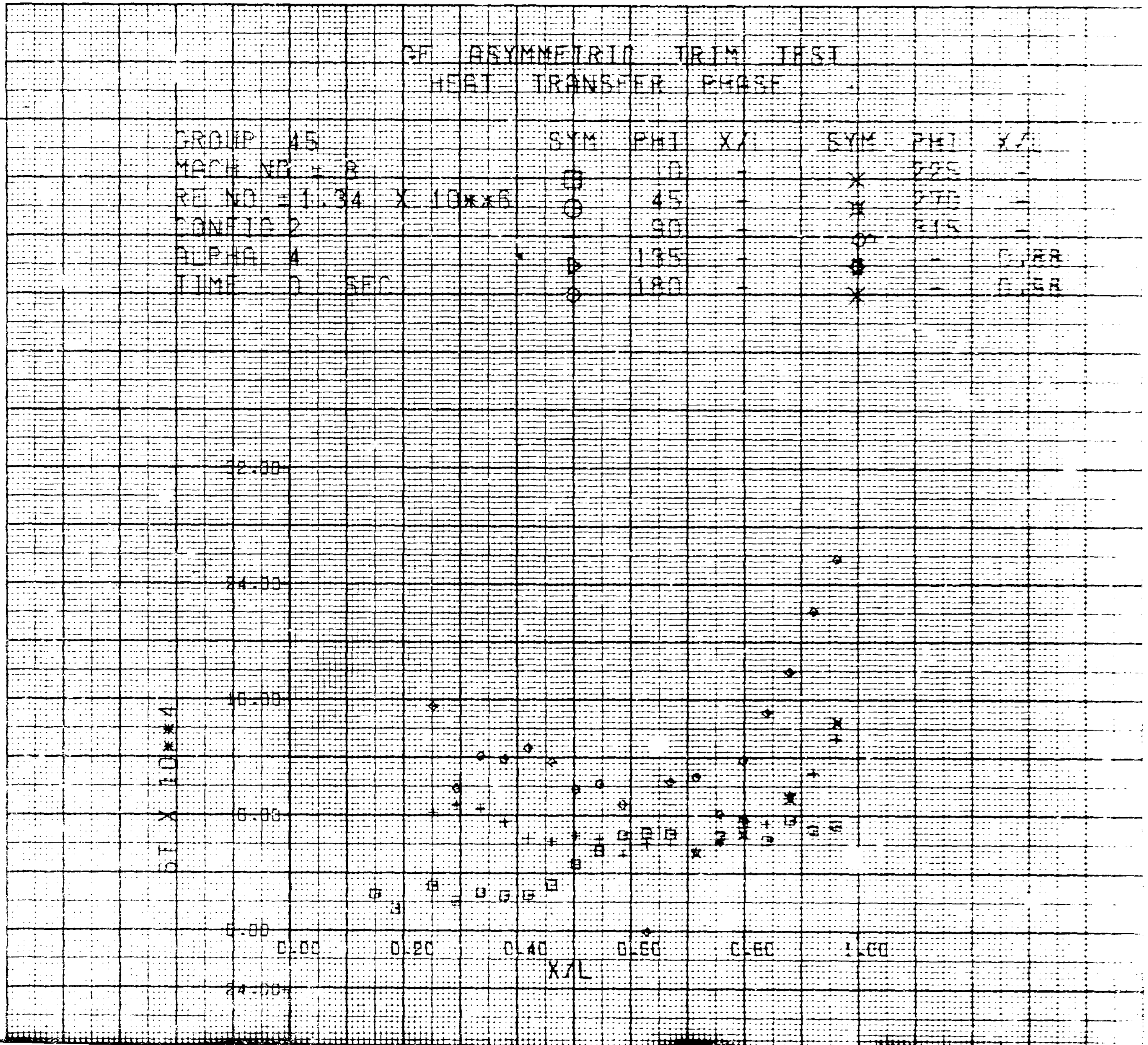
3

6/16/80

[illegible] ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
[illegible]

```
GROUP   CONFIG   ALPHA-M   BETA-M   ALPHA-T   ROLL   [illegible]   DATE   MACH NO   PO       TO        TEST
 45       2       4.00       0       4.00      0         0         715    7.07     279.00   1268.71   -0.00
    T-INF        P-INF        Q-INF        V-INF        RHO-INF      MU-INF       RE/FT        RE/D         MU
 9.2379E 01   2.9100E-02   1.0444E 00   3.7576E 03   2.4076E-05   7.0534E-08   1.3428E 06   1.7342E 06   3.1018E 02

TC NO   X/L     PHI     TEMP     SLOPE         Q-STAN        H1            H2            HW           ST

   1   .1590     0     515.71   7.0071E-01    1.0302E-01    2.2958E-04    8.8558E-04    1.2940E 02   2.0209E-04
   2   .1867     0     512.05   4.2320E-01    9.2902E-02    1.2627E-04    5.0952E-04    1.2775E 02   1.5025E-04
   3   .2524     0     533.27   6.2605E-01    2.9064E-01    2.5274E-04    1.0109E-03    1.2790E 02   3.1670E-04
   4   .2943     0     538.06   5.0613E-01    2.2503E-01    1.7131E-04    6.9162E-04    1.2923E 02   2.1469E-04
   5   .3363     0     540.15   5.8452E-01    1.5672E-01    2.1510E-04    8.6762E-04    1.2954E 02   2.6951E-04
   6   .3783     0     541.29   7.7006E-01    1.6395E-01    1.9706E-04    7.9605E-04    1.2984E 02   2.4787E-04
   7   .4203     0     541.71   5.0106E-01    1.4562E-01    2.0057E-04    8.0095E-04    1.2991E 02   2.5126E-04
   8   .4623     0     542.01   6.0410E-01    1.8044E-01    2.5946E-04    1.0472E-03    1.3017E 02   3.2920E-04
   9   .5043     0     543.39   1.0050E 00    2.7190E-01    3.7405E-04    1.5117E-03    1.3031E 02   4.6953E-04
  10   .5463     0     545.36   1.1551E 00    3.2600E-01    4.4602E-04    1.8040E-03    1.3079E 02   5.6113E-04
  11   .5882     0     546.24   1.4002E 00    3.8579E-01    5.3397E-04    2.1612E-03    1.3099E 02   6.6076E-04
  12   .6302     0     548.10   1.4444E 00    3.9369E-01    5.4244E-04    2.1971E-03    1.3115E 02   6.7729E-04
  13   .6722     0     548.27   1.4576E 00    3.9620E-01    5.4106E-04    2.1915E-03    1.3117E 02   6.7822E-04
  99   .8822   315.0   560.75   2.4115E 00    6.2915E-01    8.8955E-04    3.5048E-03    1.3445E 02   1.1132E-03
  15   .7583     0     554.04   1.9707E 00    3.7904E-01    5.7166E-04    2.1924E-03    1.3299E 02   6.6554E-04
  16   .7996     0     556.04   1.5265E 00    4.2031E-01    6.0167E-04    2.4247E-03    1.3352E 02   7.5309E-04
  17   .8409     0     557.39   1.4034E 00    3.5050E-01    5.0408E-04    2.0313E-03    1.3364E 02   6.3092E-04
  18   .8822     0     558.01   1.7514E 00    4.3877E-01    6.1735E-04    2.4877E-03    1.3379E 02   7.7267E-04
  19   .9235     0     557.56   1.4667E 00    3.6751E-01    5.5265E-04    2.2523E-03    1.3364E 02   6.9956E-04
  20   .9648     0     556.04   1.7440E 00    4.1954E-01    5.4763E-04    2.3060E-03    1.3245E 02   7.3400E-04
  21   .2524    45.0   531.01   1.1540E 00    3.4112E-01    4.6296E-04    1.8660E-03    1.2755E 02   5.8019E-04
  22   .2943    45.0   536.05   9.7643E-01    3.1300E-01    4.2779E-04    1.7357E-03    1.2875E 02   5.3909E-04
  23   .3363    45.0   538.60   1.0032E 00    3.0155E-01    4.1300E-04    1.6642E-03    1.2919E 02   5.1732E-04
  24   .3783    45.0   539.90   9.2606E-01    2.7031E-01    3.8149E-04    1.5300E-03    1.2950E 02   4.7794E-04
  25   .4203    45.0   541.86   9.1223E-01    2.6566E-01    3.6667E-04    1.4760E-03    1.2995E 02   4.5801E-04
  26   .4623    45.0   544.05   8.9230E-01    2.3353E-01    3.2252E-04    1.3006E-03    1.3041E 02   4.0395E-04
  27   .5043    45.0   545.50   8.8063E-01    2.3598E-01    3.2024E-04    1.3105E-03    1.3083E 02   4.0460E-04
 100   .9648   315.0   558.99   2.4227E 00    6.0666E-01    8.5477E-04    3.4442E-03    1.3403E 02   1.0690E-03
  29   .5882    45.0   548.45   9.8543E-01    2.4947E-01    3.4035E-04    1.3944E-03    1.3151E 02   4.3872E-04
  30   .6302    45.0   550.27   1.1140E 00    3.0134E-01    4.1948E-04    1.6911E-03    1.3195E 02   5.2529E-04
  31   .6722    45.0   550.84   1.4497E 00    3.8640E-01    5.2962E-04    2.1342E-03    1.3210E 02   6.6350E-04
  32   .7170    45.0   553.10   1.7570E 00    4.1375E-01    5.7016E-04    2.3309E-03    1.3262E 02   7.2301E-04
  33   .7583    45.0   556.64   1.8679E 00    5.1095E-01    7.2261E-04    2.9113E-03    1.3342E 02   9.0423E-04
  34   .7996    45.0   558.31   2.0216E 00    5.6723E-01    7.9044E-04    3.2174E-03    1.3387E 02   9.9930E-04
  35   .8409    45.0   560.93   2.3073E 00    6.2428E-01    8.8079E-04    3.5409E-03    1.3420E 02   1.1023E-03
  36   .8822    45.0   560.78   2.3889E 00    6.2034E-01    8.8755E-04    3.5740E-03    1.3446E 02   1.1107E-03
  37   .9235    45.0   560.96   2.3642E 00    6.0509E-01    8.5486E-04    3.4442E-03    1.3444E 02   1.0697E-03
  38   .9648    45.0   557.24   2.1643E 00    5.6857E-01    8.0027E-04    3.2248E-03    1.3385E 02   1.0016E-03
  39   .2524    90.0   530.31   1.6322E 00    4.8250E-01    6.5477E-04    2.6570E-03    1.2862E 02   8.2549E-04
  40   .2943    90.0   540.37   1.4889E 00    5.6903E-01    6.9943E-04    2.6211E-03    1.2959E 02   8.7623E-04
  41   .3363    90.0   541.37   1.4671E 00    4.9463E-01    6.8084E-04    2.7420E-03    1.2963E 02   8.5190E-04
  42   .3783    90.0   543.31   1.3875E 00    4.3795E-01    6.0371E-04    2.4347E-03    1.3029E 02   7.5421E-04
  43   .4203    90.0   544.85   1.2593E 00    3.7276E-01    5.1423E-04    2.0734E-03    1.3045E 02   6.4407E-04
  44   .4623    90.0   545.66   1.1607E 00    3.6095E-01    4.9863E-04    2.0197E-03    1.3085E 02   6.2450E-04
  45   .5043    90.0   546.95   1.3919E 00    3.8361E-01    5.3121E-04    2.1419E-03    1.3116E 02   6.6525E-04
  46   .5463    90.0   549.20   1.2932E 00    3.6924E-01    5.1323E-04    2.0601E-03    1.3169E 02   6.4206E-04
  47   .5882    90.0   549.37   1.0801E 00    3.0305E-01    4.2116E-04    1.6979E-03    1.3169E 02   5.2737E-04
  48   .6302    90.0   549.77   1.2663E 00    3.4809E-01    4.8527E-04    1.9543E-03    1.3183E 02   6.0763E-04
  49   .6722    90.0   550.05   1.4823E 00    3.6629E-01    4.8184E-04    1.9425E-03    1.3190E 02   6.0332E-04
  50   .7170    90.0   552.21   1.3490E 00    3.1783E-01    4.4057E-04    1.7840E-03    1.3245E 02   5.5535E-04
  51   .7583    90.0   553.09   1.3540E 00    3.5293E-01    4.9316E-04    1.9878E-03    1.3262E 02   6.1759E-04
  52   .7996    90.0   554.37   1.4788E 00    4.3732E-01    6.1216E-04    2.4673E-03    1.3293E 02   7.6635E-04
  53   .8409    90.0   555.23   1.4919E 00    4.2300E-01    5.9406E-04    2.3962E-03    1.3313E 02   7.4363E-04
  54   .8822    90.0   556.40   2.1952E 00    5.3805E-01    7.5693E-04    3.0503E-03    1.3351E 02   9.4792E-04
  55   .9235    90.0   556.05   2.4955E 00    6.2414E-01    8.7677E-04    3.5333E-03    1.3352E 02   1.0971E-03
  56   .9648    90.0   554.78   3.1521E 00    7.6012E-01    1.0656E-03    4.2922E-03    1.3330E 02   1.3331E-03
  57   .2524   135.0   531.84   4.4529E-01    1.3754E-01    1.8665E-04    7.5372E-04    1.2756E 02   2.3295E-04
  58   .2943   135.0   536.29   2.0377E 00    7.4950E-01    1.0232E-03    4.1282E-03    1.2861E 02   1.2822E-03
  59   .3363   135.0   536.04   2.0771E 00    6.5559E-01    8.9574E-04    3.6137E-03    1.2875E 02   1.1224E-03
  60   .3783   135.0   535.82   1.0507E 00    6.0046E-01    8.3019E-04    3.3444E-03    1.2851E 02   1.0402E-03
  61   .4203   135.0   538.58   2.0146E 00    6.0553E-01    8.2940E-04    3.3457E-03    1.2916E 02   1.0392E-03
  62   .4623   135.0   539.93   1.8433E 00    5.4721E-01    7.5085E-04    3.0240E-03    1.2949E 02   9.4902E-04
  63   .5043   135.0   541.35   2.0171E 00    5.1546E-01    7.0855E-04    2.8578E-03    1.2982E 02   8.8762E-04
  64   .5463   135.0   542.31   1.9559E 00    5.1938E-01    7.1498E-04    2.8857E-03    1.3005E 02   8.9565E-04
  65   .5882   135.0   543.92   1.8744E 00    4.9774E-01    6.6671E-04    2.7693E-03    1.3043E 02   8.6014E-04
  66   .6302   135.0   544.52   1.9327E 00    5.1322E-01    7.0867E-04    2.8578E-03    1.3058E 02   8.8761E-04
  67   .6722   135.0   545.78   1.8994E 00    4.8061E-01    6.6490E-04    2.6815E-03    1.3088E 02   8.3205E-04
  68   .7170   135.0   547.31   1.9527E 00    4.5984E-01    6.3746E-04    2.5780E-03    1.3124E 02   7.9829E-04
  69   .7583   135.0   547.60   1.7035E 00    3.6573E-01    5.0715E-04    2.0448E-03    1.3131E 02   6.3512E-04
  70   .7996   135.0   550.44   2.1105E 00    6.1323E-01    8.5373E-04    3.4417E-03    1.3199E 02   1.0690E-03
  71   .8409   135.0   552.24   2.1557E 00    5.9396E-01    8.2899E-04    3.3416E-03    1.3242E 02   1.0379E-03
  72   .8822   135.0   553.04   2.7237E 00    7.3686E-01    1.0296E-03    4.1508E-03    1.3261E 02   1.2898E-03
  73   .9235   135.0   553.48   3.4426E 00    8.9407E-01    1.2588E-03    5.0384E-03    1.3271E 02   1.5649E-03
  74   .9648   135.0   555.10   4.4120E 00    1.1021E 00    1.5542E-03    6.2637E-03    1.3310E 02   1.9455E-03
  75   .2524   180.0   531.97   3.1592E 00    9.1795E-01    1.2458E-03    5.0274E-03    1.2750E 02   1.5615E-03
  76   .2943   180.0   537.64   1.8023E 00    5.7795E-01    7.9039E-04    3.1845E-03    1.2894E 02   9.9034E-04
  77   .3363   180.0   539.91   2.1834E 00    7.0456E-01    9.6672E-04    3.8994E-03    1.2948E 02   1.2111E-03
  78   .3783   180.0   541.34   2.1863E 00    6.9326E-01    9.5308E-04    3.8441E-03    1.2982E 02   1.1939E-03
  79   .4203   180.0   543.88   2.4853E 00    7.3469E-01    1.0123E-03    4.0827E-03    1.3022E 02   1.2681E-03
  80   .4623   180.0   544.84   2.3721E 00    6.7734E-01    9.3576E-04    3.7735E-03    1.3065E 02   1.1720E-03
  81   .5043   180.0   546.33   2.0663E 00    5.6775E-01    7.8591E-04    3.1690E-03    1.3101E 02   9.8426E-04
  82   .5463   180.0   547.93   2.2101E 00    5.8649E-01    8.1422E-04    3.2828E-03    1.3139E 02   1.0196E-03
  83   .5882   180.0   548.92   1.9840E 00    5.0615E-01    7.0317E-04    2.8349E-03    1.3163E 02   8.8051E-04
  84   .6302   180.0   540.83  -9.8481E-03   -2.1504E-03   -2.9543E-06   -1.1918E-05    1.2970E 02  -3.7018E-06
  85   .6722   180.0   552.24   2.4694E 00    5.9385E-01    8.2884E-04    3.3410E-03    1.3242E 02   1.0377E-03
  86   .7170   180.0   554.19   2.4116E 00    6.1500E-01    8.6057E-04    3.4685E-03    1.3286E 02   1.0773E-03
  87   .7583   180.0   555.17   1.9490E 00    4.6870E-01    6.5684E-04    2.6472E-03    1.3312E 02   8.2222E-04
  88   .7996   180.0   558.02   2.4986E 00    6.7693E-01    9.5247E-04    3.8381E-03    1.3380E 02   1.1921E-03
  89   .8409   180.0   559.72   3.1057E 00    8.6507E-01    1.2201E-03    4.9161E-03    1.3420E 02   1.5269E-03
  90   .8822   180.0   561.21   4.4309E 00    1.0210E 00    1.4431E-03    5.8142E-03    1.3456E 02   1.8059E-03
  91   .9235   180.0   562.07   5.1226E 00    1.2575E 00    1.7794E-03    7.1649E-03    1.3476E 02   2.2264E-03
  92   .9648   180.0   561.72   6.3460E 00    1.4624E 00    2.0684E-03    8.3312E-03    1.3468E 02   2.5883E-03
  93   .8822   225.0   563.17   2.9111E 00    7.4383E-01    1.0542E-03    4.2470E-03    1.3503E 02   1.3191E-03
  94   .9648   225.0   561.75   [illegible]   1.0932E 00    1.5442E-03    6.2211E-03    1.3469E 02   1.9323E-03
  95   .7170   270.0   556.64   [illegible]   3.1103E-01    4.3792E-04    1.7644E-03    1.3347E 02   5.4814E-04
  96   .7996   270.0   562.38   1.4519E 00    3.8544E-01    5.4567E-04    2.1983E-03    1.3484E 02   6.8279E-04
  97   .8822   270.0   567.77   2.0368E 00    5.2621E-01    7.3897E-04    2.9747E-03    1.3541E 02   9.2455E-04
  98   .9648   270.0   561.37   3.4173E 00    8.2179E-01    1.1610E-03    4.6806E-03    1.3459E 02   1.4538E-03
```

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PHI XJ SYM PHI XJ
TABLE 45


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 45
MACH NO = 8
RE NO = 1.34 X 10**6
CONFIG 2
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.88
32.00
24.00
16.00
8.00
0.00
-8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

2

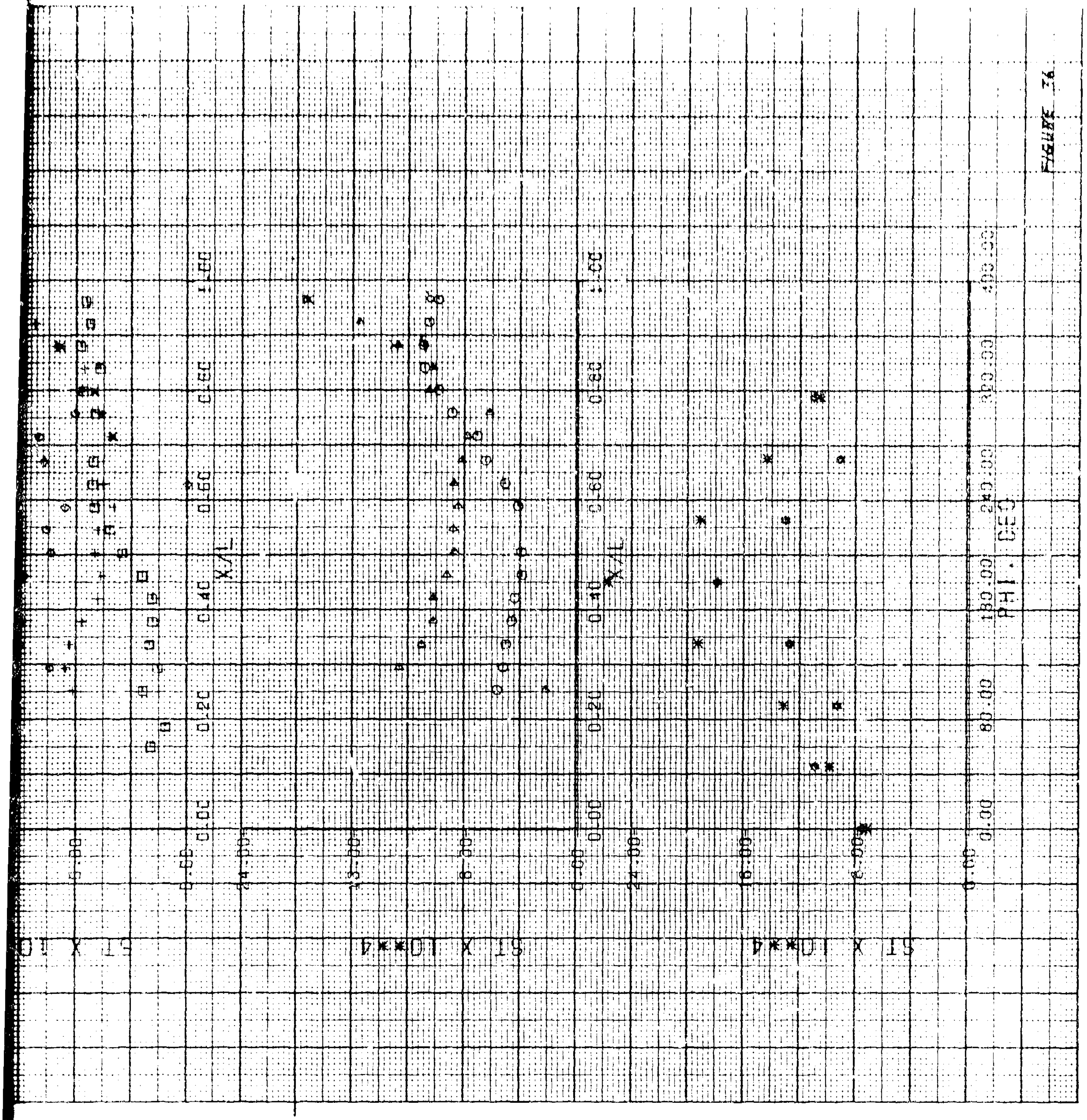
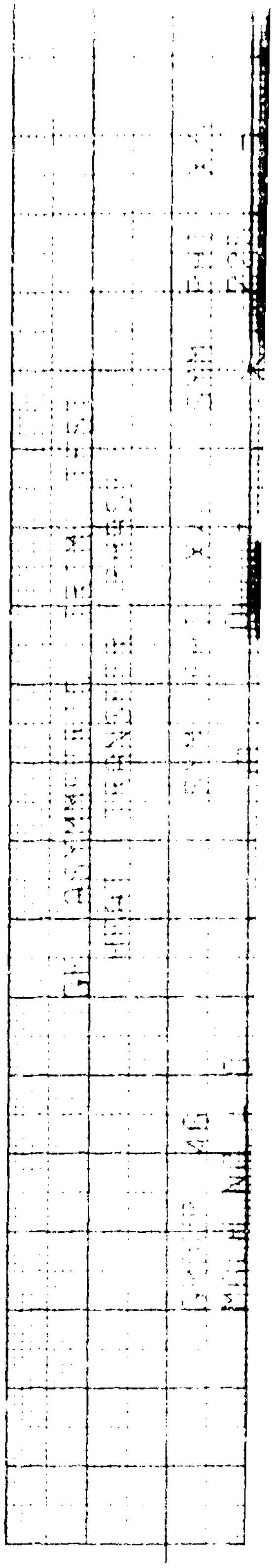
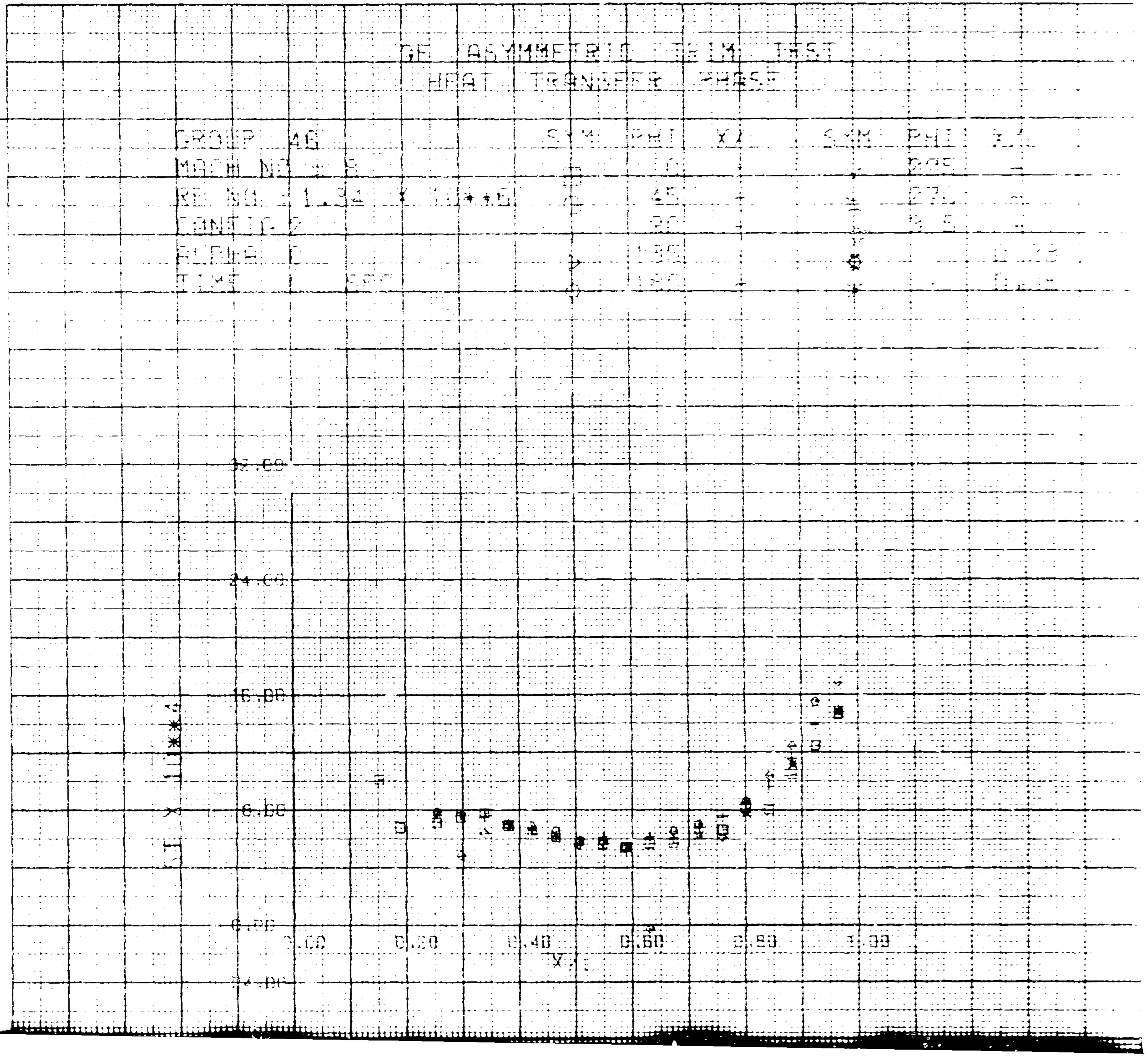


FIGURE 36
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
X/L
0.00
0.20
0.40
0.60
0.80
1.00
ST X 10**4
ST X 10
0.00
8.00
16.00
24.00

Figure 36

```
                                   7/16/69

            [illegible] ARNOLD AF STA, TENNESSEE
               VON KARMAN GAS DYNAMICS FACILITY
                 50 INCH HYPERSONIC TUNNEL B
                        [illegible]
GROUP  CONFIG   ALPHA-M    BETA-M     ALPHA-S   ROLL  ALP-P  DATE   MACH NO    PO        TO       TIME
 46      2        .12         0         .08       0     0    7.15    7.47     279.8    1266.78     -.08
  T-INF       P-INF       Q-INF       V-INF      RHO-INF      MU-INF      RE/FT       RE/L       [illegible]
9.2641E 01  2.9291E-02  1.1604E 00  3.7567E 03  2.5540E-05  7.4421E-08  1.1611E 06  1.4205E 06  3.0000E 02

TC NO   X/L    PHI     TEMP     DTDT        Q-BTUS       HT           HH          [illegible]    ST

  1    ,1900     0    527.76  2.1809E 00  9.9705E-01  8.0778E-04  3.0598E-03  1.2695E 02  1.0196E-03
  2    ,1867     0    528.24  1.8228E 00  8.0124E-01  5.5113E-04  2.1931E-03  1.2671E 02  6.8284E-04
  3    ,2524     0    530.80  1.4119E 00  4.1733E-01  5.6711E-04  2.2889E-03  1.2715E 02  7.1746E-04
  4    ,2943     0    533.76  1.3064E 00  4.3760E-01  5.9044E-04  2.4088E-03  1.2806E 02  7.4599E-04
  5    ,3361     0    535.59  1.4110E 00  4.5166E-01  6.1778E-04  2.4924E-03  1.2845E 02  7.7609E-04
  6    ,3783     0    536.81  1.3371E 00  4.0193E-01  5.5063E-04  2.2210E-03  1.2875E 02  6.9173E-04
  7    ,4203     0    537.39  1.2567E 00  3.8535E-01  5.0061E-04  2.0198E-03  1.2880E 02  6.2487E-04
  8    ,4623     0    538.77  1.2788E 00  3.5230E-01  4.8400E-04  1.9528E-03  1.2921E 02  6.0796E-04
  9    ,5043     0    539.36  1.2322E 00  3.3330E-01  4.5825E-04  1.8487E-03  1.2936E 02  5.7540E-04
 10    ,5463     0    541.76  1.1996E 00  3.2249E-01  4.4490E-04  1.7941E-03  1.2992E 02  5.5062E-04
 11    ,5882     0    543.65  1.1354E 00  3.0842E-01  4.2619E-04  1.7147E-03  1.3038E 02  5.3345E-04
 12    ,6302     0    545.15  1.1490E 00  3.2193E-01  4.4607E-04  1.7990E-03  1.3073E 02  5.6012E-04
 13    ,6722     0    547.26  1.2859E 00  3.2314E-01  4.4911E-04  1.8110E-03  1.3123E 02  5.6387E-04
 99    ,8822   315.0  555.21  2.2692E 00  5.9113E-01  8.3074E-04  3.3456E-03  1.3313E 02  1.0426E-03
 15    ,7583     0    550.07  1.5699E 00  3.7752E-01  5.2071E-04  2.1236E-03  1.3149E 02  6.6121E-04
 16    ,7996     0    551.38  1.4601E 00  4.6019E-01  6.4326E-04  2.5913E-03  1.3221E 02  8.0765E-04
 17    ,8409     0    551.79  1.7880E 00  4.5680E-01  6.3897E-04  2.5760E-03  1.3271E 02  8.0205E-04
 18    ,8822     0    552.30  2.3807E 00  5.9643E-01  8.3470E-04  3.3652E-03  1.3259E 02  1.0478E-03
 19    ,9235     0    551.76  2.4275E 00  7.0835E-01  9.9071E-04  3.9940E-03  1.3231E 02  1.2436E-03
 20    ,9648     0    552.28  3.6625E 00  8.3266E-01  1.1656E-03  4.6990E-03  1.3253E 02  1.4628E-03
 21    ,2524   45.0   527.77  1.6281E 00  4.8128E-01  6.5125E-04  2.6260E-03  1.2650E 02  8.1956E-04
 22    ,2943   45.0   530.23  1.4113E 00  4.5244E-01  6.1432E-04  2.4705E-03  1.2719E 02  7.7262E-04
 23    ,3363   45.0   531.67  1.3924E 00  4.1855E-01  5.6952E-04  2.2945E-03  1.2757E 02  7.1565E-04
 24    ,3783   45.0   533.52  1.2936E 00  3.8967E-01  5.3115E-04  2.1419E-03  1.2796E 02  6.6737E-04
 25    ,4203   45.0   534.80  1.1424E 00  3.3194E-01  4.5354E-04  1.8301E-03  1.2824E 02  5.6982E-04
 26    ,4623   45.0   537.07  1.2540E 00  3.5185E-01  4.8270E-04  1.9475E-03  1.2879E 02  6.0636E-04
 27    ,5043   45.0   539.27  1.2704E 00  3.3735E-01  4.6367E-04  1.8705E-03  1.2932E 02  5.8241E-04
100    ,9648   315.0  557.25  3.2875E 00  7.9057E-01  1.1142E-03  4.4956E-03  1.3361E 02  1.3982E-03
 29    ,5882   45.0   542.11  1.2370E 00  3.4083E-01  4.7013E-04  1.8971E-03  1.3000E 02  5.8768E-04
 30    ,6302   45.0   544.10  1.3368E 00  3.3459E-01  4.6299E-04  1.8673E-03  1.3048E 02  5.8140E-04
 31    ,6722   45.0   546.01  1.6710E 00  3.6106E-01  5.0278E-04  2.0273E-03  1.3155E 02  6.3121E-04
 32    ,7170   45.0   550.31  1.5708E 00  3.6991E-01  5.1631E-04  2.0816E-03  1.3196E 02  6.4814E-04
 33    ,7583   45.0   549.51  1.5967E 00  4.3995E-01  6.1336E-04  2.4730E-03  1.3177E 02  7.7080E-04
 34    ,7996   45.0   550.09  1.6844E 00  4.7261E-01  6.5990E-04  2.6608E-03  1.3205E 02  8.2867E-04
 35    ,8409   45.0   551.90  2.0340E 00  5.5027E-01  7.6983E-04  3.1035E-03  1.3236E 02  9.6629E-04
 36    ,8822   45.0   552.61  2.4151E 00  6.3524E-01  8.8923E-04  3.5847E-03  1.3246E 02  1.1161E-03
 37    ,9235   45.0   552.89  2.4271E 00  7.4790E-01  1.0475E-03  4.2229E-03  1.3256E 02  1.3148E-03
 38    ,9648   45.0   555.17  3.2507E 00  7.8176E-01  1.0985E-03  4.4276E-03  1.3310E 02  1.3786E-03
 39    ,2524   90.0   529.50  1.5201E 00  4.4930E-01  6.0955E-04  2.4604E-03  1.2703E 02  7.6605E-04
 40    ,2943   90.0   530.99  1.4001E 00  4.4991E-01  6.1010E-04  2.4624E-03  1.2736E 02  7.6668E-04
 41    ,3363   90.0   532.04  1.1950E 00  4.4055E-01  5.9960E-04  2.4109E-03  1.2761E 02  7.5345E-04
 42    ,3783   90.0   533.44  1.1602E 00  4.1039E-01  5.5980E-04  2.2540E-03  1.2800E 02  7.0336E-04
 43    ,4203   90.0   534.94  1.1247E 00  3.9156E-01  5.3507E-04  2.1541E-03  1.2830E 02  6.7226E-04
 44    ,4623   90.0   536.14  1.1555E 00  3.5895E-01  4.9129E-04  1.9823E-03  1.2859E 02  6.1720E-04
 45    ,5043   90.0   537.39  1.2662E 00  3.4336E-01  4.7075E-04  1.8993E-03  1.2888E 02  5.9136E-04
 46    ,5463   90.0   539.11  1.2473E 00  3.5619E-01  4.8950E-04  1.9747E-03  1.2929E 02  6.1485E-04
 47    ,5882   90.0   540.30  1.6426E 00  2.9254E-01  4.0272E-04  1.6246E-03  1.2959E 02  5.0382E-04
 48    ,6302   90.0   [illegible] 1.2825E 00  3.5337E-01  4.8728E-04  1.9655E-03  1.2980E 02  6.1198E-04
 49    ,6722   90.0   546.95  1.1870E 00  3.4748E-01  4.8271E-04  1.9465E-03  1.3115E 02  6.0607E-04
 50    ,7170   90.0   546.07  1.4321E 00  3.8435E-01  5.3519E-04  2.1580E-03  1.3155E 02  6.7196E-04
 51    ,7583   90.0   [illegible] 1.6624E 00  4.2763E-01  5.9276E-04  2.3905E-03  1.3069E 02  7.4431E-04
 52    ,7996   90.0   [illegible] 1.6784E 00  4.8932E-01  6.7834E-04  2.7356E-03  1.3050E 02  8.5177E-04
 53    ,8409   90.0   546.62  2.1889E 00  5.4830E-01  7.6123E-04  3.0697E-03  1.3103E 02  9.5570E-04
 54    ,8822   90.0   547.70  2.4910E 00  6.6055E-01  9.1861E-04  3.7042E-03  1.3134E 02  1.1533E-03
 55    ,9235   90.0   541.99  3.0033E 00  7.9198E-01  1.1017E-03  4.4423E-03  1.3130E 02  1.3831E-03
 56    ,9648   90.0   550.75  3.4663E 00  8.5715E-01  1.1971E-03  4.8263E-03  1.3207E 02  1.5027E-03
 57    ,2524  135.0   524.04  2.7121E-01  8.0172E-02  1.0795E-04  4.3584E-04  1.2571E 02  1.3573E-04
 58    ,2943  135.0   525.22  2.5302E 00  4.9250E-01  6.6423E-04  2.6817E-03  1.2501E 02  8.3496E-04
 59    ,3363  135.0   525.72  1.4491E 00  4.5734E-01  6.1721E-04  2.4918E-03  1.2510E 02  7.7583E-04
 60    ,3783  135.0   525.34  1.3106E 00  4.0713E-01  5.4911E-04  2.2169E-03  1.2501E 02  6.9025E-04
 61    ,4203  135.0   528.62  1.4209E 00  4.2714E-01  5.7865E-04  2.3357E-03  1.2680E 02  7.2725E-04
 62    ,4623  135.0   530.32  1.1993E 00  3.4857E-01  4.7318E-04  1.9098E-03  1.2720E 02  5.9464E-04
 63    ,5043  135.0   531.90  1.3045E 00  3.4804E-01  4.7442E-04  1.9147E-03  1.2757E 02  5.9615E-04
 64    ,5463  135.0   533.39  1.2437E 00  3.3028E-01  4.5017E-04  1.8166E-03  1.2786E 02  5.6563E-04
 65    ,5882  135.0   534.79  1.2041E 00  3.1976E-01  4.3681E-04  1.7627E-03  1.2826E 02  5.4883E-04
 66    ,6302  135.0   536.11  1.6439E 00  3.9406E-01  5.3931E-04  2.1760E-03  1.2858E 02  6.7753E-04
 67    ,6722  135.0   542.28  1.4750E 00  3.5472E-01  4.8960E-04  1.9748E-03  1.3004E 02  6.1488E-04
 68    ,7170  135.0   543.77  1.6042E 00  3.7778E-01  5.2251E-04  2.1079E-03  1.3048E 02  6.5616E-04
 69    ,7583  135.0   539.03  1.0777E 00  3.0240E-01  4.1598E-04  1.6781E-03  1.2946E 02  5.2249E-04
 70    ,7996  135.0   542.03  1.8303E 00  5.3413E-01  7.3698E-04  2.9727E-03  1.2998E 02  9.2557E-04
 71    ,8409  135.0   544.13  2.1432E 00  5.9052E-01  8.1716E-04  3.2957E-03  1.3049E 02  1.0261E-03
 72    ,8822  135.0   544.56  2.5121E 00  6.7961E-01  9.4104E-04  3.7952E-03  1.3059E 02  1.1817E-03
 73    ,9235  135.0   545.91  3.1227E 00  7.8130E-01  1.0838E-03  4.3708E-03  1.3091E 02  1.3609E-03
 74    ,9648  135.0   551.28  4.0053E 00  9.6320E-01  1.3462E-03  5.4273E-03  1.3219E 02  1.6890E-03
 75    ,2524  180.0   526.06  1.5964E 00  4.6386E-01  6.2505E-04  2.5236E-03  1.2585E 02  7.8574E-04
 76    ,2943  180.0   527.11  8.8897E-01  2.8502E-01  3.8534E-04  1.5555E-03  1.2643E 02  4.8433E-04
 77    ,3363  180.0   529.27  1.2723E 00  3.7611E-01  5.0994E-04  2.0585E-03  1.2695E 02  6.4092E-04
 78    ,3783  180.0   531.21  1.3522E 00  4.0648E-01  5.5260E-04  2.2303E-03  1.2741E 02  6.9442E-04
 79    ,4203  180.0   533.14  1.1621E 00  4.0268E-01  5.4888E-04  2.2150E-03  1.2788E 02  6.8967E-04
 80    ,4623  180.0   534.92  1.3410E 00  3.8296E-01  5.2326E-04  2.1114E-03  1.2829E 02  6.5742E-04
 81    ,5043  180.0   537.10  1.2847E 00  3.2154E-01  4.4107E-04  1.7796E-03  1.2881E 02  5.5408E-04
 82    ,5463  180.0   539.16  1.2380E 00  3.2875E-01  4.5182E-04  1.8228E-03  1.2930E 02  5.6753E-04
 83    ,5882  180.0   540.47  1.1514E 00  3.0577E-01  4.2098E-04  1.6981E-03  1.2960E 02  5.2873E-04
 84    ,6302  180.0   540.96 -4.5941E-02 -1.7511E-02 -2.4125E-05 -9.7314E-05  1.2972E 02 -3.0300E-05
 85    ,6722  180.0   548.75  1.5561E 00  3.7621E-01  5.2116E-04  2.1014E-03  1.3159E 02  6.5427E-04
 86    ,7170  180.0   550.39  1.6444E 00  3.9667E-01  5.5371E-04  2.2324E-03  1.3198E 02  6.9508E-04
 87    ,7583  180.0   547.79  1.4382E 00  3.4566E-01  4.8103E-04  1.9397E-03  1.3136E 02  6.0393E-04
 88    ,7996  180.0   549.55  1.8846E 00  4.9094E-01  6.8450E-04  2.7598E-03  1.3178E 02  8.5936E-04
 89    ,8409  180.0   551.04  2.1179E 00  5.9224E-01  8.2751E-04  3.3362E-03  1.3214E 02  1.0307E-03
 90    ,8822  180.0   552.47  3.1716E 00  7.0782E-01  9.9092E-04  3.9947E-03  1.3247E 02  1.2438E-03
 91    ,9235  180.0   553.72  3.5809E 00  8.7971E-01  1.2327E-03  4.9691E-03  1.3277E 02  1.5472E-03
 92    ,9648  180.0   557.97  4.1418E 00  9.5445E-01  1.3465E-03  5.4267E-03  1.3378E 02  1.6896E-03
 93    ,8822  225.0   556.15  2.6882E 00  6.8687E-01  9.6657E-04  3.8957E-03  1.3335E 02  1.2130E-03
 94    ,9648  225.0   558.91  3.6595E 00  8.8085E-01  1.2433E-03  5.0102E-03  1.3401E 02  1.5600E-03
 95    ,7170  270.0   554.87  1.5635E 00  3.5249E-01  4.9513E-04  1.9958E-03  1.3305E 02  6.2139E-04
 96    ,7996  270.0   556.91  1.6469E 00  4.3733E-01  6.1608E-04  2.4830E-03  1.3353E 02  7.7310E-04
 97    ,8822  270.0   559.80  2.1669E 00  6.2880E-01  8.8952E-04  3.5845E-03  1.3424E 02  1.1161E-03
 98    ,9648  270.0   559.47  3.4784E 00  8.3461E-01  1.1800E-03  4.7550E-03  1.3414E 02  1.4695E-03
```




GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 46
MACH NO = 5
RE NO = 1.34 X 10**6
CONFIG 2
ALPHA 0
TIME SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
32.00
24.00
16.00
8.00
0.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

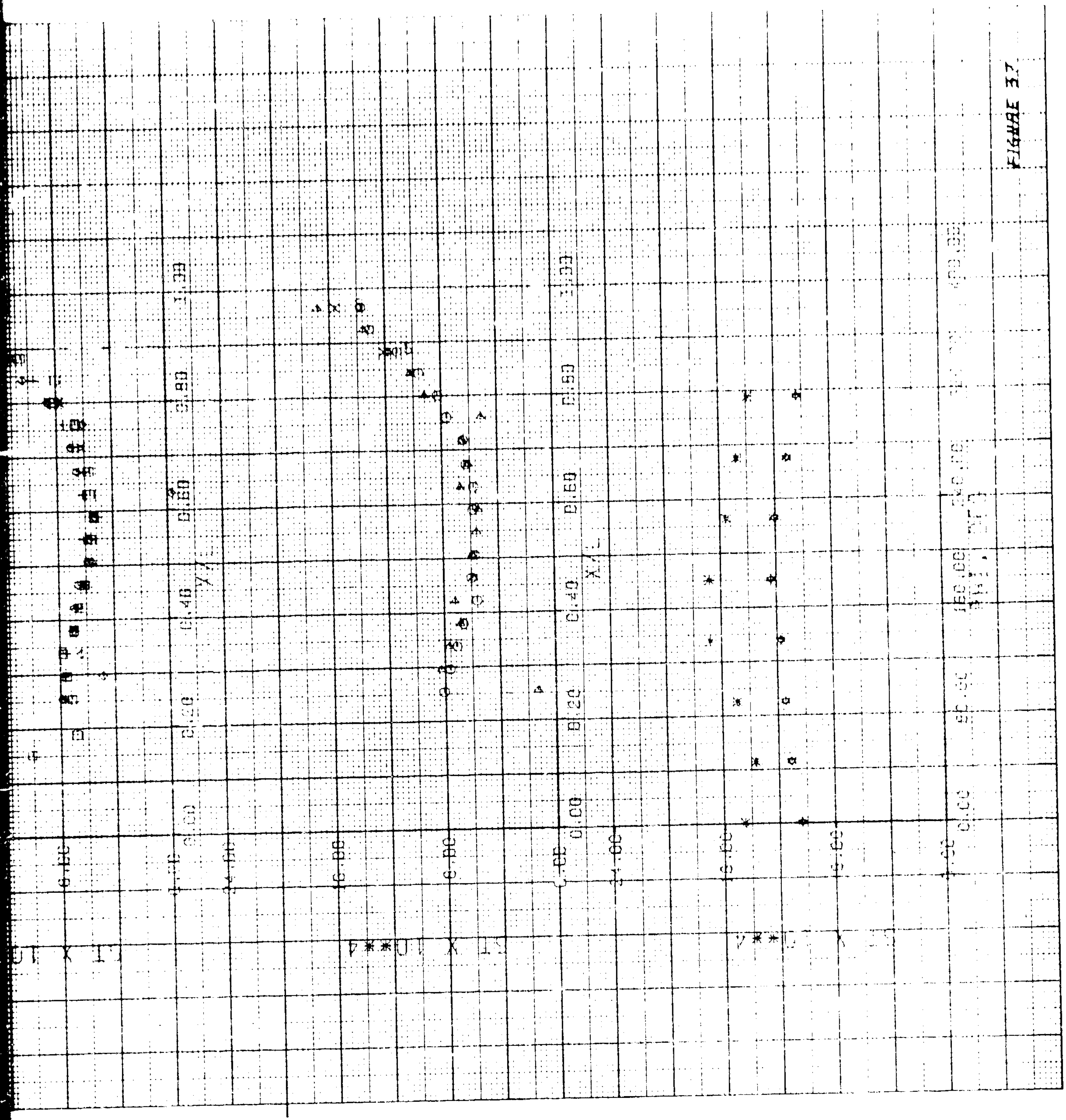


FIGURE 37
0.00
0.20
0.40
0.60
0.80
1.00
Y/L
X/L
0.00
80.00
160.00
240.00
400.00

Figure [illegible]

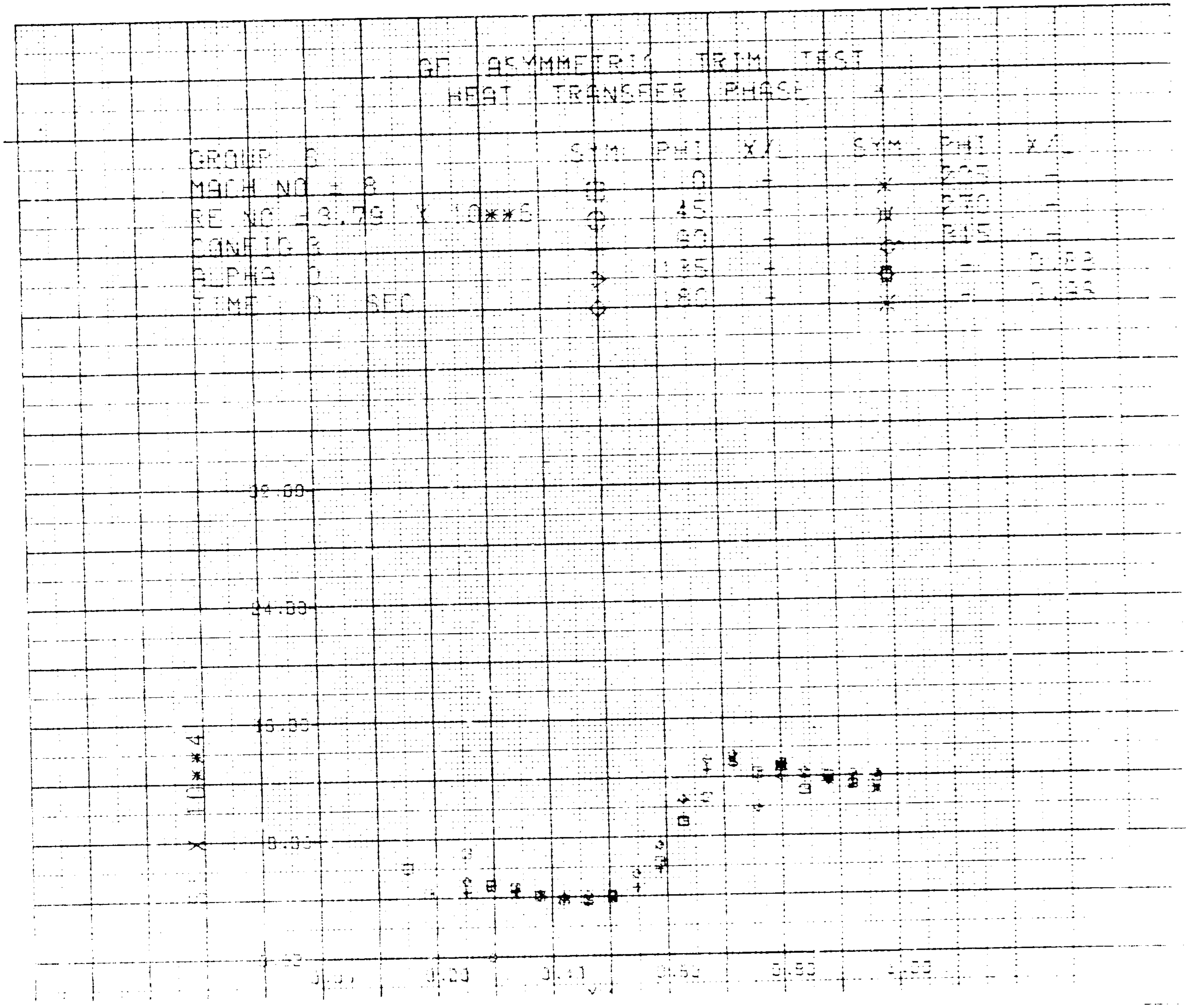
3

```
                                          9/14/69

                          ARO, INC., ARNOLD AFS, TENNESSEE
                          VON KARMAN GAS DYNAMICS FACILITY
                           50 INCH HYPERSONIC TUNNEL B
                                   VT0967-000
GROUP   CON ID    ALPHA-M      BETA-M       ALPHA-S     ROLL    ALP-P   DATE       MACH NO        PO          TO           TIME
  6        3         .03          0           .03          0        0     7.4          8.00        860.6      1334.13        4.00
  T-INF        P-INF        U-INF         V-INF        RHO-INF       MU-INF        RE/FT         RE/D           MU
9.00759E 01  8.81693E-02  3.94712E 00  3.85430E 01  7.64420E-05  7.70330E-08  3.78037E 06  3.47195E 06  3.27037E 02

TC NO   X/L     PHI     TEMP     SLOPE        Q-STDN        HT            HM            HW            ST

   1   .1900     0     997.80   9.4129E 00   7.1907E 00   1.4319E-03   9.7049E-03   1.1939E 00   8.0030E-04
   2   .1667     0     489.64   1.9675E 00   8.7132E-01   1.0318E-03   4.1583E-03   1.1755E 02   4.3855E-04
   3   .2524     0     492.96   4.7515E 00   1.4044E 00   1.6648E-03   6.7248E-03   1.1833E 02   7.0963E-04
   4   .2943     0     506.21   3.0305E 00   9.5652E-01   1.1553E-03   4.6521E-03   1.2147E 02   4.9063E-04
   5   .3363     0     511.06   2.8043E 00   9.1037E-01   1.1061E-03   4.4526E-03   1.2262E 02   4.6953E-04
   6   .3783     0     516.25   2.6600E 00   7.9954E-01   9.7525E-04   3.9253E-03   1.2318E 02   4.1397E-04
   7   .4203     0     515.87   2.9458E 00   7.4552E-01   9.1084E-04   3.6658E-03   1.2371E 02   3.8661E-04
   8   .4623     0     519.84   2.4427E 00   7.2815E-01   8.9421E-04   3.5940E-03   1.2471E 02   3.7966E-04
   9   .5043     0     522.08   2.4693E 00   7.7627E-01   9.5594E-04   3.8459E-03   1.2524E 02   4.0561E-04
  10   .5463     0     529.02  -1.1451E-02  -8.8295E-03  -1.0969E-05  -4.4112E-05   1.2703E 02  -4.6522E-06
  11   .5882     0     527.19   4.1940E 00   1.2107E 00   1.5003E-03   6.0342E-03   1.2664E 02   6.3639E-04
  12   .6302     0     531.95   6.3676E 00   1.7227E 00   2.1479E-03   8.6353E-03   1.2759E 02   9.1071E-04
  13   .6722     0     539.19   7.9986E 00   2.0038E 00   2.5207E-03   1.0132E-02   1.2951E 02   1.0685E-03
  99   .8822   315.0   541.04   9.6579E 00   1.6739E 00   1.9584E-03   7.4690E-03   1.2975E 02   7.8771E-04
  15   .7583     0     541.62   9.6292E 00   2.3156E 00   2.9219E-03   1.1743E-02   1.2989E 02   1.2385E-03
  16   .7996     0     541.20   8.6325E 00   2.4221E 00   3.0546E-03   1.2277E-02   1.2979E 02   1.2947E-03
  17   .8409     0     540.60   8.1513E 00   2.0827E 00   2.6249E-03   1.0550E-02   1.2966E 02   1.1126E-03
  18   .8822     0     544.61   8.9670E 00   2.2464E 00   2.8456E-03   1.1433E-02   1.3060E 02   1.2058E-03
  19   .9235     0     545.96   8.5319E 00   2.1374E 00   2.7117E-03   1.0895E-02   1.3091E 02   1.1491E-03
  20   .9648     0     548.24   9.2341E 00   2.2206E 00   2.8256E-03   1.1352E-02   1.3146E 02   1.1972E-03
  21   .2524    45.0   489.54   3.5818E 00   1.0588E 00   1.2537E-03   5.0527E-03   1.1752E 02   5.3287E-04
  22   .2943    45.0   502.55   3.0258E 00   9.7814E-01   1.1666E-03   4.6986E-03   1.2060E 02   4.9553E-04
  23   .3363    45.0   507.52   2.8858E 00   8.6747E-01   1.0494E-03   4.2254E-03   1.2178E 02   4.4563E-04
  24   .3783    45.0   511.60   2.6578E 00   7.9893E-01   9.7161E-04   3.9104E-03   1.2277E 02   4.1240E-04
  25   .4203    45.0   514.80   2.5228E 00   7.3301E-01   8.9377E-04   3.5974E-03   1.2332E 02   3.7940E-04
  26   .4623    45.0   518.94   2.4267E 00   7.3699E-01   9.0409E-04   3.6340E-03   1.2450E 02   3.8367E-04
  27   .5043    45.0   522.32   2.4535E 00   7.0465E-01   8.6799E-04   3.4921E-03   1.2530E 02   3.6829E-04
 100   .9648   315.0   592.04   8.1655E 00   2.0117E 00   2.5749E-03   1.0342E-02   1.3256E 02   1.0907E-03
  29   .5882    45.0   527.30   4.4225E 00   1.2185E 00   1.5104E-03   6.0750E-03   1.2650E 02   6.4070E-04
  30   .6302    45.0   532.62   6.4904E 00   1.7559E 00   2.1908E-03   8.8049E-03   1.2775E 02   9.2902E-04
  31   .6722    45.0   542.76   9.5868E 00   2.3533E 00   2.9737E-03   1.1950E-02   1.3016E 02   1.2603E-03
  32   .7170    45.0   546.07   1.0443E 01   2.4592E 00   3.1204E-03   1.2538E-02   1.3094E 02   1.3223E-03
  33   .7583    45.0   542.26   9.0119E 00   2.4831E 00   3.1356E-03   1.2601E-02   1.3003E 02   1.3298E-03
  34   .7996    45.0   542.27   9.5321E 00   2.3939E 00   3.0232E-03   1.2150E-02   1.3004E 02   1.2813E-03
  35   .8409    45.0   544.90   8.7484E 00   2.2586E 00   2.8618E-03   1.1499E-02   1.3067E 02   1.2128E-03
  36   .8822    45.0   546.92   8.0938E 00   2.1289E 00   2.7043E-03   1.0865E-02   1.3115E 02   1.1459E-03
  37   .9235    45.0   547.76   8.1639E 00   2.0809E 00   2.6462E-03   1.0631E-02   1.3135E 02   1.1212E-03
  38   .9648    45.0   549.28   8.6532E 00   1.9366E 00   2.4675E-03   9.9127E-03   1.3171E 02   1.0454E-03
  39   .2524    90.0   492.30   2.9315E 00   8.6657E-01   1.0294E-03   4.1492E-03   1.1818E 02   4.3748E-04
  40   .2943    90.0   504.46   2.9196E 00   9.3604E-01   1.1203E-03   4.5436E-03   1.2106E 02   4.7918E-04
  41   .3363    90.0   509.07   2.7845E 00   8.7847E-01   1.0652E-03   4.2806E-03   1.2215E 02   4.5229E-04
  42   .3783    90.0   511.97   2.7338E 00   8.6287E-01   1.0495E-03   4.2248E-03   1.2284E 02   4.4556E-04
  43   .4203    90.0   515.85   2.7018E 00   7.9868E-01   9.7510E-04   3.9245E-03   1.2357E 02   4.1389E-04
  44   .4623    90.0   513.60   2.7079E 00   6.8585E-01   8.3893E-04   3.3782E-03   1.2394E 02   3.5607E-04
  45   .5043    90.0   520.35   2.6313E 00   7.2501E-01   8.9092E-04   3.5847E-03   1.2483E 02   3.7805E-04
  46   .5463    90.0   522.47   3.0897E 00   8.8233E-01   1.0871E-03   4.3734E-03   1.2533E 02   4.6123E-04
  47   .5882    90.0   526.21   3.9869E 00   1.1186E 00   1.3846E-03   5.5692E-03   1.2622E 02   5.8735E-04
  48   .6302    90.0   531.34   6.3920E 00   1.7612E 00   2.1938E-03   8.8218E-03   1.2744E 02   9.3038E-04
  49   .6722    90.0   541.86   9.3960E 00   2.3539E 00   2.9681E-03   1.1929E-02   1.2975E 02   1.2581E-03
  50   .7170    90.0   545.58   1.0086E 01   2.3752E 00   3.0122E-03   1.2103E-02   1.3083E 02   1.2764E-03
  51   .7583    90.0   539.32   8.6139E 00   2.2439E 00   2.8232E-03   1.1348E-02   1.2934E 02   1.1968E-03
  52   .7996    90.0   540.61   8.9358E 00   2.3278E 00   2.9336E-03   1.1790E-02   1.2965E 02   1.2435E-03
  53   .8409    90.0   541.17   8.9231E 00   2.2354E 00   2.8191E-03   1.1330E-02   1.2978E 02   1.1949E-03
  54   .8822    90.0   543.79   8.8984E 00   2.1843E 00   2.7636E-03   1.1105E-02   1.3039E 02   1.1712E-03
  55   .9235    90.0   544.97   8.9392E 00   2.1257E 00   2.6934E-03   1.0823E-02   1.3067E 02   1.1414E-03
  56   .9648    90.0   544.91   8.7030E 00   2.0929E 00   2.6519E-03   1.0656E-02   1.3068E 02   1.1238E-03
  57   .2524   135.0   487.78   9.5104E-01   2.8114E-01   3.3218E-04   1.3389E-03   1.1711E 02   1.4121E-04
  58   .2943   135.0   498.82   2.9546E 00   9.1526E-01   1.0457E-03   4.4139E-03   1.1972E 02   4.6550E-04
  59   .3363   135.0   502.81   2.0571E 00   6.4929E-01   7.8104E-04   3.1456E-03   1.2067E 02   3.3174E-04
  60   .3783   135.0   505.90   2.6369E 00   8.1914E-01   9.8904E-04   3.9826E-03   1.2140E 02   4.2002E-04
  61   .4203   135.0   508.56   2.4355E 00   7.9222E-01   9.5961E-04   3.8635E-03   1.2203E 02   4.0746E-04
  62   .4623   135.0   511.40   2.5027E 00   7.2719E-01   8.8388E-04   3.5581E-03   1.2273E 02   3.7525E-04
  63   .5043   135.0   514.47   2.7809E 00   7.1054E-01   8.6687E-04   3.4890E-03   1.2343E 02   3.6797E-04
  64   .5463   135.0   516.77   3.2582E 00   8.6522E-01   1.0586E-03   4.2600E-03   1.2398E 02   4.4927E-04
  65   .5882   135.0   519.92   4.4995E 00   1.1944E 00   1.4675E-03   5.9047E-03   1.2473E 02   6.2273E-04
  66   .6302   135.0   524.28   6.6891E 00   1.7763E 00   2.1933E-03   8.8272E-03   1.2576E 02   9.3053E-04
  67   .6722   135.0   537.06   9.6555E 00   2.3099E 00   2.8980E-03   1.1650E-02   1.2880E 02   1.2286E-03
  68   .7170   135.0   540.11   1.0379E 01   2.4441E 00   3.0782E-03   1.2372E-02   1.2953E 02   1.3048E-03
  69   .7583   135.0   530.32   6.3678E 00   1.7867E 00   2.2228E-03   8.9387E-03   1.2720E 02   9.4270E-04
  70   .7996   135.0   534.22   8.9237E 00   2.5638E 00   3.2051E-03   1.2886E-02   1.2813E 02   1.3590E-03
  71   .8409   135.0   535.94   9.1593E 00   2.2481E 00   2.8165E-03   1.1323E-02   1.2854E 02   1.1942E-03
  72   .8822   135.0   537.18   9.1755E 00   2.2659E 00   2.8432E-03   1.1429E-02   1.2883E 02   1.2054E-03
  73   .9235   135.0   539.75   8.6675E 00   2.1276E 00   2.6782E-03   1.0765E-02   1.2943E 02   1.1353E-03
  74   .9648   135.0   542.35   9.0212E 00   2.1694E 00   2.7399E-03   1.1011E-02   1.3006E 02   1.1613E-03
  75   .2524   180.0   490.50   3.5230E 00   1.0236E 00   1.2134E-03   4.8900E-03   1.1775E 02   5.1571E-04
  76   .2943   180.0  -116.74  -1.1546E-14  -3.7020E-15  -2.5515E-18  -1.0694E-17  -2.1036E 01  -1.1215E-18
  77   .3363   180.0   506.90   2.6493E 00   7.8317E-01   9.4674E-04   3.8121E-03   1.2164E 02   4.0203E-04
  78   .3783   180.0   510.28   2.4758E 00   8.0435E-01   9.7632E-04   3.9305E-03   1.2244E 02   4.1452E-04
  79   .4203   180.0   513.60   2.6222E 00   7.7516E-01   9.4471E-04   3.8025E-03   1.2323E 02   4.0163E-04
  80   .4623   180.0   517.15   2.7780E 00   7.9330E-01   9.7102E-04   3.9076E-03   1.2407E 02   4.1211E-04
  81   .5043   180.0   520.11   3.1243E 00   7.8320E-01   9.6214E-04   3.8713E-03   1.2477E 02   4.0828E-04
  82   .5463   180.0   522.75   4.0251E 00   1.0669E 00   1.3173E-03   5.2997E-03   1.2540E 02   5.5893E-04
  83   .5882   180.0   525.66   5.3094E 00   1.4312E 00   1.7702E-03   7.1265E-03   1.2609E 02   7.5095E-04
  84   .6302   180.0   531.96   7.5232E 00   1.9978E 00   2.4985E-03   1.0014E-02   1.2759E 02   1.0562E-03
  85   .6722   180.0   544.21   1.0281E 01   2.4725E 00   3.1301E-03   1.2578E-02   1.3051E 02   1.3265E-03
  86   .7170   180.0   547.56   1.0702E 01   2.5202E 00   3.2040E-03   1.2872E-02   1.3130E 02   1.3576E-03
  87   .7583   180.0   537.98   7.7802E 00   1.8710E 00   2.3500E-03   9.4465E-03   1.2902E 02   9.9626E-04
  88   .7996   180.0   541.84   8.6433E 00   2.2516E 00   2.8390E-03   1.1410E-02   1.2975E 02   1.2034E-03
  89   .8409   180.0   542.29   9.0735E 00   2.3104E 00   2.9278E-03   1.1766E-02   1.3005E 02   1.2409E-03
  90   .8822   180.0   544.10   9.5121E 00   2.1920E 00   2.7745E-03   1.1149E-02   1.3048E 02   1.1758E-03
  91   .9235   180.0   545.39   9.3654E 00   2.2744E 00   2.8836E-03   1.1586E-02   1.3078E 02   1.2219E-03
  92   .9648   180.0   549.84   9.7900E 00   2.2560E 00   2.8767E-03   1.1556E-02   1.3166E 02   1.2187E-03
  93   .8822   225.0   546.09   8.4581E 00   2.1611E 00   2.7424E-03   1.1019E-02   1.3095E 02   1.1621E-03
  94   .9648   225.0   551.25   8.7117E 00   2.0950E 00   2.6760E-03   1.0749E-02   1.3218E 02   1.1336E-03
  95   .7170   270.0   552.05   1.0851E 01   2.4454E 00   3.1312E-03   1.2577E-02   1.3256E 02   1.1264E-03
  96   .7996   270.0   549.96   8.9526E 00   2.3774E 00   3.0316E-03   1.2178E-02   1.3187E 02   1.2044E-03
  97   .8822   270.0   549.95   8.6049E 00   2.1731E 00   2.7712E-03   1.1132E-02   1.3187E 02   1.1740E-03
  98   .9648   270.0   552.95   8.5517E 00   2.0565E 00   2.6326 -03   1.0574E-02   1.3259E 02   1.1151E-03
```

GROUP 1 SYM PHI X/L SYM PHI X/L

HEAT TRANSFER PHASE

CF ASYMMETRIC TRIM TEST



GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE 4

2

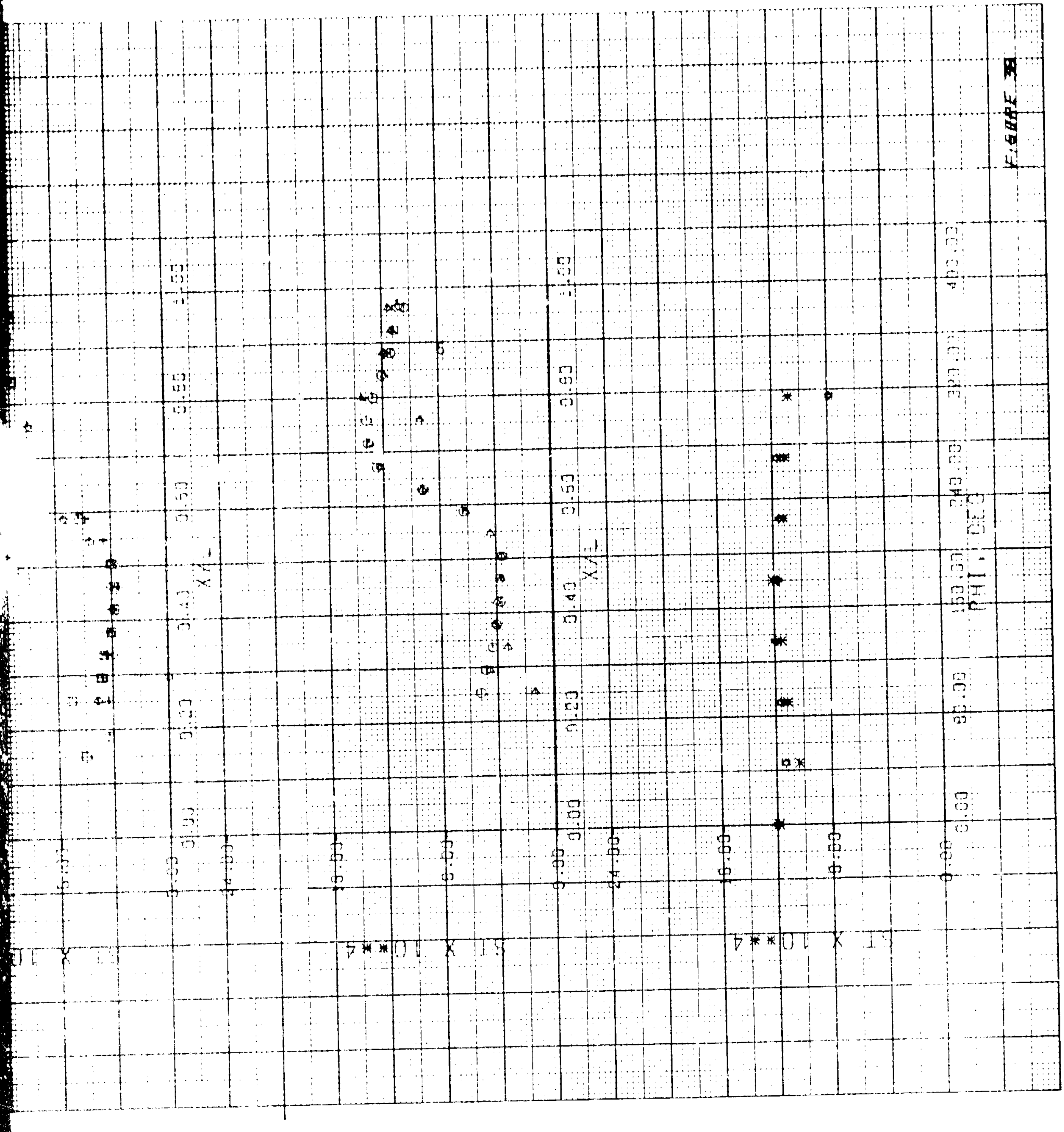


FIGURE 38
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
XA
XL
0.00
0.20
0.40
0.60
0.80
1.00
ST X 10**4
SL X 10**4
8.00
16.00
24.00

Figure 38

7/16/69

ARO(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-000

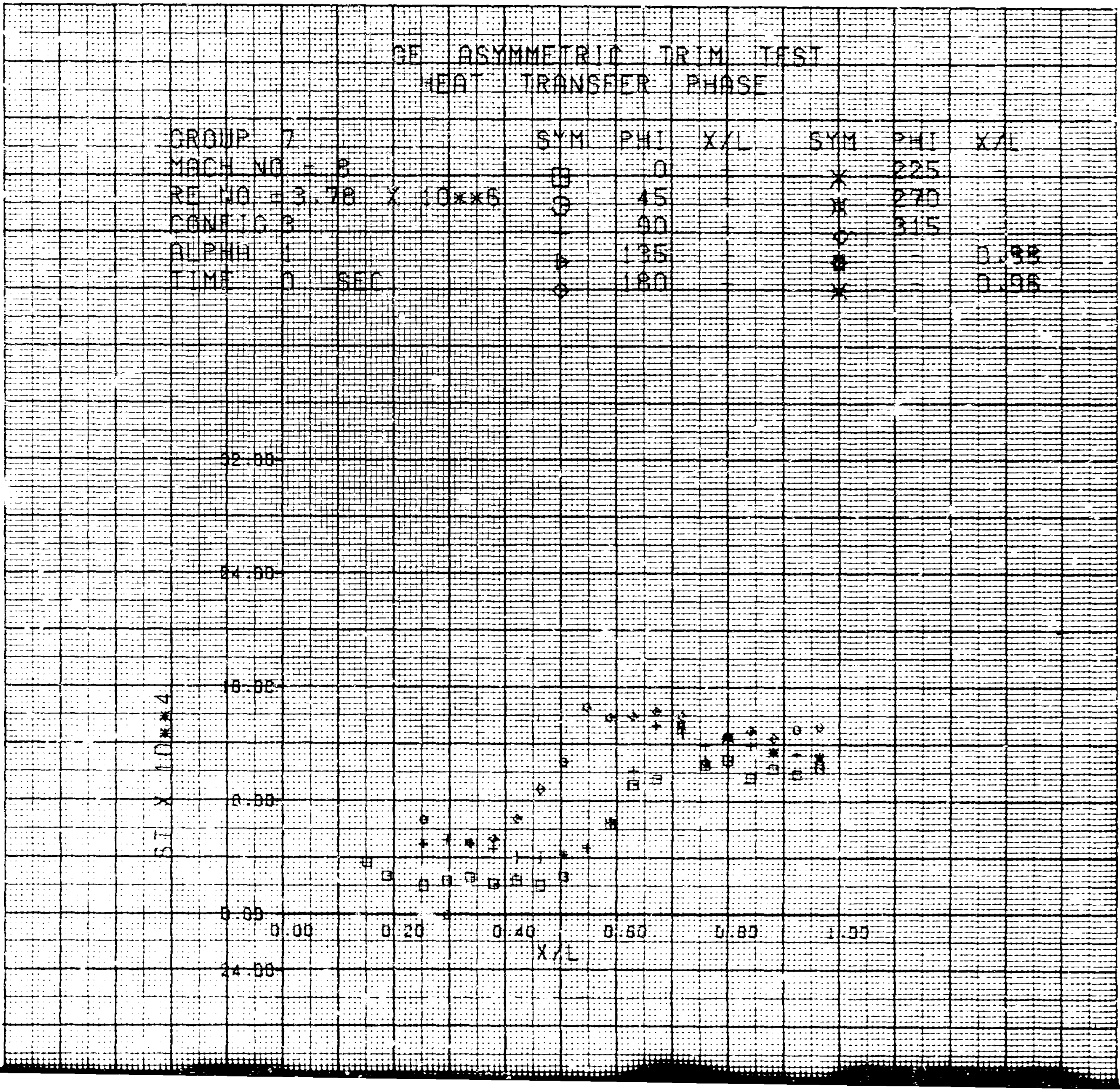
GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
7	3	1.05	0	1.05	0	0	716	8.08	900.00	1335.73	.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.6792E 01	4.8074E-02	3.9957E 00	3.8566E 03	7.0303E-05	7.7927E-08	3.7702E 06	3.4453E 05	3.2747E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDN	HT	HM	HW	ST
1	.1509	0	490.10	3.9900E 00	7.3000E-01	8.7329E-04	3.3190E-03	1.1790E 02	3.7100E-04
2	.1867	0	470.70	2.6074E 00	5.4627E-01	6.3746E-04	2.5704E-03	1.1490E 02	2.7139E-04
3	.2524	0	483.20	1.6010E 00	4.1415E-01	4.8579E-04	1.9584E-03	1.1602E 02	2.0674E-04
4	.2943	0	493.47	1.6899E 00	4.7020E-01	5.6504E-04	2.2759E-03	1.2002E 02	2.4020E-04
5	.3363	0	506.26	1.6372E 00	5.1474E-01	6.2297E-04	2.5063E-03	1.2149E 02	2.6567E-04
6	.3783	0	507.49	1.4367E 00	4.3147E-01	5.2068E-04	2.0943E-03	1.2177E 02	2.2199E-04
7	.4203	0	509.70	1.6194E 00	4.7655E-01	5.6737E-04	2.2921E-03	1.2220E 02	2.4196E-04
8	.4623	0	512.94	1.6021E 00	4.0835E-01	4.9629E-04	1.9975E-03	1.2397E 02	2.1907E-04
9	.5043	0	515.25	1.9077E 00	5.1611E-01	6.2903E-04	2.5314E-03	1.2362E 02	2.6723E-04
10	.5463	0	520.97	2.7969E-02	7.8670E-03	9.7272E-06	3.9110E-05	1.2608E 02	4.1293E-05
11	.5882	0	522.04	6.6556E 00	1.2277E 00	1.5087E-03	6.0669E-03	1.2523E 02	6.4071E-04
12	.6302	0	527.01	6.6609E 00	1.7679E 00	2.1635E-03	8.7090E-03	1.2660E 02	9.1647E-04
13	.6722	0	535.86	7.2091E 00	1.8060E 00	2.2579E-03	9.0746E-03	1.2852E 02	9.5814E-04
14	.8622	315.0	530.91	5.7459E 00	1.4960E 00	1.8785E-03	7.5609E-03	1.2924E 02	7.9700E-04
15	.7583	0	537.75	8.1125E 00	1.9990E 00	2.5051E-03	1.0069E-02	1.2897E 02	1.0629E-03
16	.7996	0	537.39	7.3223E 00	2.0545E 00	2.5734E-03	1.0349E-02	1.2880E 02	1.0915E-03
17	.8409	0	537.21	7.0980E 00	1.8136E 00	2.2712E-03	9.1201E-03	1.2886E 02	9.6371E-04
18	.8822	0	541.32	7.7137E 00	1.9324E 00	2.4325E-03	9.7754E-03	1.2941E 02	1.0319E-03
19	.9235	0	542.06	7.6180E 00	1.8505E 00	2.3415E-03	9.4079E-03	1.3610E 02	9.9326E-04
20	.9648	0	544.95	9.0344E 00	1.9321E 00	2.4413E-03	9.8148E-03	1.3060E 02	1.0363E-03
21	.2524	45.0	479.56	2.9770E 00	8.0027E-01	1.0201E-03	4.1450E-03	1.1516E 02	4.3707E-04
22	.2943	45.0	497.40	2.4964E 00	8.0045E-01	9.5491E-04	3.8440E-03	1.1941E 02	4.0660E-04
23	.3363	45.0	501.41	2.4961E 00	7.5034E-01	8.9934E-04	3.6220E-03	1.2033E 02	3.8235E-04
24	.3783	45.0	504.47	2.1292E 00	7.0015E-01	8.4228E-04	3.3910E-03	1.2106E 02	3.5803E-04
25	.4203	45.0	507.84	2.7398E 00	6.3080E-01	7.5990E-04	3.1060E-03	1.2183E 02	3.3161E-04
26	.4623	45.0	512.71	2.2906E 00	6.4209E-01	7.8089E-04	[illegible]	1.2302E 02	3.3179E-04
27	.5043	45.0	516.02	2.2064E 00	6.0717E-01	7.4070E-04	2.9807E-03	1.2390E 02	3.1466E-04
100	.9640	315.0	549.33	8.0947E 00	1.9466E 00	2.4753E-03	9.9432E-03	1.3173E 02	1.0496E-03
29	.5882	45.0	520.91	2.7486E 00	6.1950E-01	7.6028E-04	3.0587E-03	1.2496E 02	3.2209E-04
30	.6302	45.0	525.89	1.1961E 00	8.6465E-01	1.0677E-03	4.2943E-03	1.2615E 02	4.5332E-04
31	.6722	45.0	530.91	9.1400E 00	1.2372E 00	1.5479E-03	6.2223E-03	1.2867E 02	6.5605E-04
32	.7170	45.0	541.46	7.4542E 00	1.7554E 00	2.2101E-03	8.8013E-03	1.2905E 02	9.3759E-04
33	.7583	45.0	538.60	8.0538E 00	2.2191E 00	2.7838E-03	1.1149E-02	1.2917E 02	1.1811E-03
34	.7996	45.0	539.13	8.7222E 00	2.3351E 00	2.9313E-03	1.1781E-02	1.2929E 02	1.2437E-03
35	.8409	45.0	541.80	9.1427E 00	2.2570E 00	2.8429E-03	1.1424E-02	1.2993E 02	1.2060E-03
36	.8822	45.0	543.55	4.0364E 00	2.1130E 00	2.6603E-03	1.0722E-02	1.3035E 02	1.1310E-03
37	.9235	45.0	545.22	7.9939E 00	2.0425E 00	2.5838E-03	1.0381E-02	1.3074E 02	1.0950E-03
38	.9648	45.0	546.49	7.7480E 00	1.8536E 00	2.3486E-03	9.4354E-03	1.3185E 02	9.9606E-04
39	.2524	90.0	482.38	3.3759E 00	9.4796E-01	1.1695E-03	4.7147E-03	1.1503E 02	4.9770E-04
40	.2943	90.0	497.78	3.2500E 00	1.0420E 00	1.2435E-03	5.0091E-03	1.1947E 02	5.2070E-04
41	.3363	90.0	501.09	3.1342E 00	9.8925E-01	1.1864E-03	4.7770E-03	1.2045E 02	5.0430E-04
42	.3783	90.0	505.71	2.8717E 00	9.0640E-01	1.0920E-03	4.3970E-03	1.2136E 02	4.6417E-04
43	.4203	90.0	509.37	2.6551E 00	7.8689E-01	9.4977E-04	3.8239E-03	1.2271E 02	4.0361E-04
44	.4623	90.0	511.39	2.5392E 00	7.8876E-01	9.5683E-04	3.8514E-03	1.2270E 02	4.0657E-04
45	.5043	90.0	515.21	2.9993E 00	8.2640E-01	1.0072E-03	4.0531E-03	1.2361E 02	4.2787E-04
46	.5463	90.0	519.13	3.1471E 00	8.9872E-01	1.1006E-03	4.4280E-03	1.2454E 02	4.6744E-04
47	.5882	90.0	521.40	4.4609E 00	1.2516E 00	1.5370E-03	6.1834E-03	1.2508E 02	6.5275E-04
48	.6302	90.0	526.75	7.0256E 00	1.9350E 00	2.3920E-03	9.6230E-03	1.2635E 02	1.0159E-03
49	.6722	90.0	530.96	1.0052E 01	2.5183E 00	3.1606E-03	1.2703E-02	1.2925E 02	1.3410E-03
50	.7170	90.0	543.20	1.0240E 01	2.4113E 00	3.0620E-03	1.2227E-02	1.3028E 02	1.2907E-03
51	.7583	90.0	536.65	8.4463E 00	2.2529E 00	2.8193E-03	1.1333E-02	1.2870E 02	1.1963E-03
52	.7996	90.0	537.35	8.9499E 00	2.3445E 00	2.9365E-03	1.1083E-02	1.2867E 02	1.2460E-03
53	.8409	90.0	538.90	8.9722E 00	2.2677E 00	2.8268E-03	1.1357E-02	1.2924E 02	1.1960E-03
54	.8822	90.0	541.61	4.7556E 00	2.1492E 00	2.7060E-03	1.0870E-02	1.2989E 02	1.1401E-03
55	.9235	90.0	543.83	8.8484E 00	2.1260E 00	2.6819E-03	1.0777E-02	1.3022E 02	1.1376E-03
56	.9648	90.0	542.93	4.7036E 00	2.0930E 00	2.6481E-03	1.0609E-02	1.3020E 02	1.1197E-03
57	.2524	135.0	478.35	1.1678E 00	3.4572E-01	4.0265E-04	1.6236E-03	1.1488E 02	1.7140E-04
58	.2943	135.0	493.34	3.8902E 00	1.2473E 00	1.4806E-03	5.9650E-03	1.1842E 02	6.2975E-04
59	.3363	135.0	496.05	3.4969E 00	1.1037E 00	1.3157E-03	5.3002E-03	1.1925E 02	5.5951E-04
60	.3783	135.0	500.41	3.1566E 00	9.8058E-01	1.1739E-03	4.7279E-03	1.2010E 02	4.9910E-04
61	.4203	135.0	503.50	3.3153E 00	9.9857E-01	1.1976E-03	4.8220E-03	1.2085E 02	5.0905E-04
62	.4623	135.0	506.97	[illegible]	9.7290E-01	1.1739E-03	4.7244E-03	1.2165E 02	4.9893E-04
63	.5043	135.0	510.83	4.4605E 00	1.1141E 00	1.3506E-03	5.4367E-03	1.2257E 02	5.7392E-04
64	.5463	135.0	514.04	6.1261E 00	1.6260E 00	1.9798E-03	7.9679E-03	1.2333E 02	8.4113E-04
65	.5882	135.0	519.44	9.0063E 00	2.4129E 00	2.9559E-03	1.1893E-02	1.2461E 02	1.2554E-03
66	.6302	135.0	523.72	1.0793E 01	2.8660E 00	3.5295E-03	1.4197E-02	1.2562E 02	1.4987E-03
67	.6722	135.0	530.60	1.1581E 01	2.7851E 00	3.4847E-03	1.4087E-02	1.2867E 02	1.4787E-03
68	.7170	135.0	530.70	1.0800E 01	2.5433E 00	3.1912E-03	1.2826E-02	1.2921E 02	1.3540E-03
69	.7583	135.0	520.23	6.4480E 00	1.8655E 00	2.3099E-03	9.2844E-03	1.2670E 02	9.8003E-04
70	.7996	135.0	532.67	9.0265E 00	2.6227E 00	3.2659E-03	1.3131E-02	1.2776E 02	1.3861E-03
71	.8409	135.0	534.01	8.5582E 00	2.3500E 00	2.9441E-03	1.1836E-02	1.2827E 02	1.2494E-03
72	.8822	135.0	535.76	8.8620E 00	2.3975E 00	2.9970E-03	1.2048E-02	1.2849E 02	1.2718E-03
73	.9235	135.0	537.57	9.1641E 00	2.2495E 00	2.8184E-03	1.1328E-02	1.2872E 02	1.1958E-03
74	.9648	135.0	542.38	9.6641E 00	2.3105E 00	2.9124E-03	1.1703E-02	1.3067E 02	1.2354E-03
75	.2524	180.0	479.30	4.4462E 00	1.3500E 00	1.5763E-03	6.3560E-03	1.1510E 02	6.7096E-04
76	.2943	180.0	-316.76	6.1927E-08	1.9855E-08	1.3670E-11	5.6967E-11	-2.1036E 01	6.0137E-12
77	.3363	180.0	501.31	3.9683E 00	9.9333E-01	1.1984E-03	4.7940E-03	1.2031E 02	5.0611E-04
78	.3783	180.0	505.31	3.6097E 00	1.0520E 00	1.2672E-03	5.1021E-03	1.2131E 02	5.3860E-04
79	.4203	180.0	509.16	4.4482E 00	1.3149E 00	1.5908E-03	6.4041E-03	1.2217E 02	6.7665E-04
80	.4623	180.0	513.71	4.0285E 00	1.7216E 00	2.0943E-03	8.4289E-03	1.2325E 02	8.8979E-04
81	.5043	180.0	518.24	[illegible]	2.0821E 00	2.5469E-03	1.0240E-02	1.2433E 02	1.0810E-03
82	.5463	180.0	522.01	1.0579E 01	2.8301E 00	3.4543E-03	1.3809E-02	1.2541E 02	1.4440E-03
83	.5882	180.0	525.21	1.0014E 01	2.6580E 00	3.2804E-03	1.3194E-02	1.2590E 02	1.3920E-03
84	.6302	180.0	530.64	9.9946E 00	2.6541E 00	3.2966E-03	1.3250E-02	1.2728E 02	1.3993E-03
85	.6722	180.0	542.76	1.1165E 01	2.6848E 00	3.3857E-03	1.3605E-02	1.3016E 02	1.4362E-03
86	.7170	180.0	546.54	1.1092E 01	2.6122E 00	3.3100E-03	1.3299E-02	1.3106E 02	1.4030E-03
87	.7583	180.0	536.42	4.4924E 00	2.0423E 00	2.5550E-03	1.0270E-02	1.2865E 02	1.0842E-03
88	.7996	180.0	540.01	9.1114E 00	2.3715E 00	2.9828E-03	1.1987E-02	1.2950E 02	1.2655E-03
89	.8409	180.0	541.56	9.5317E 00	2.4354E 00	3.0664E-03	1.2313E-02	1.2986E 02	1.3008E-03
90	.8822	180.0	543.29	1.0119E 01	2.3318E 00	2.9426E-03	1.1824E-02	1.3028E 02	1.2482E-03
91	.9235	180.0	544.57	9.4613E 00	2.4403E 00	3.0864E-03	1.2743E-02	1.3059E 02	1.3043E-03
92	.9648	180.0	548.96	1.0714E 01	2.4809E 00	3.1300E-03	1.2605E-02	1.3103E 02	1.3307E-03
93	.8822	225.0	544.72	8.0545E 00	2.2024E 00	2.8601E-03	1.1492E-02	1.3063E 02	1.2131E-03
94	.9648	225.0	549.09	9.7257E 00	2.2100E 00	2.8232E-03	1.1340E-02	1.3106E 02	1.1971E-03
95	.7170	270.0	551.21	1.0976E 01	2.4746E 00	3.1543E-03	1.2669E-02	1.3217E 02	1.3374E-03
96	.7996	270.0	546.31	8.8130E 00	2.3405E 00	2.9640E-03	1.1911E-02	1.3100E 02	1.2576E-03
97	.8822	270.0	547.96	8.1625E 00	2.1367E 00	2.7120E-03	1.0805E-02	1.3131E 02	1.1501E-03
98	.9648	270.0	550.05	8.5256E 00	2.0582E 00	2.6122E-03	1.0492E-02	1.3209E 02	1.1076E-03

GROUP 7 GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE SYM PHI X/L
SYM PHI X/L

1


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 7
MACH NO = 8
RE NO =3.78 X 10**6
CONFIG 2
ALPHA 1
TIME 0. SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.98
0.96
32.00
24.00
16.00
8.00
0.00
24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

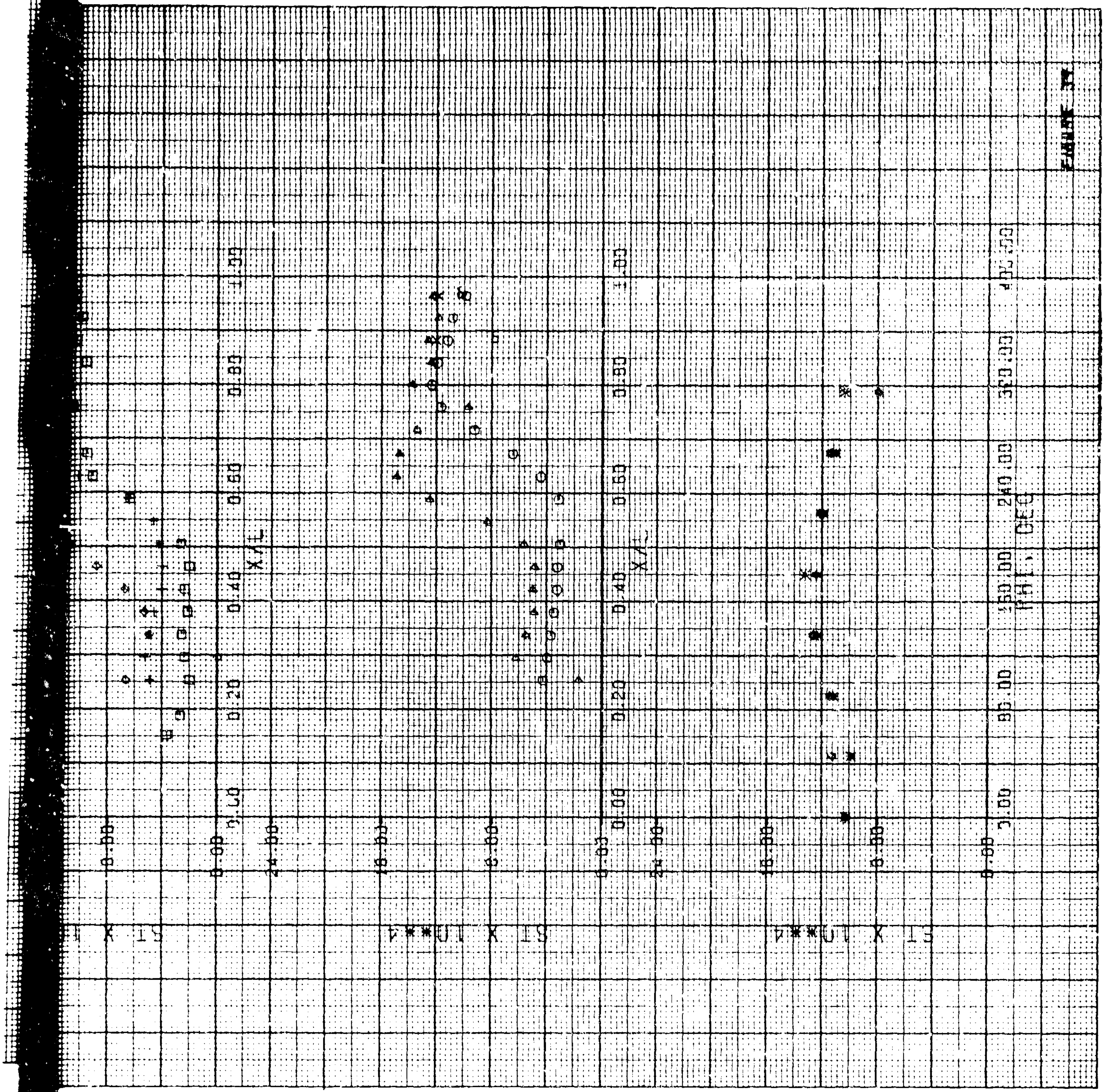


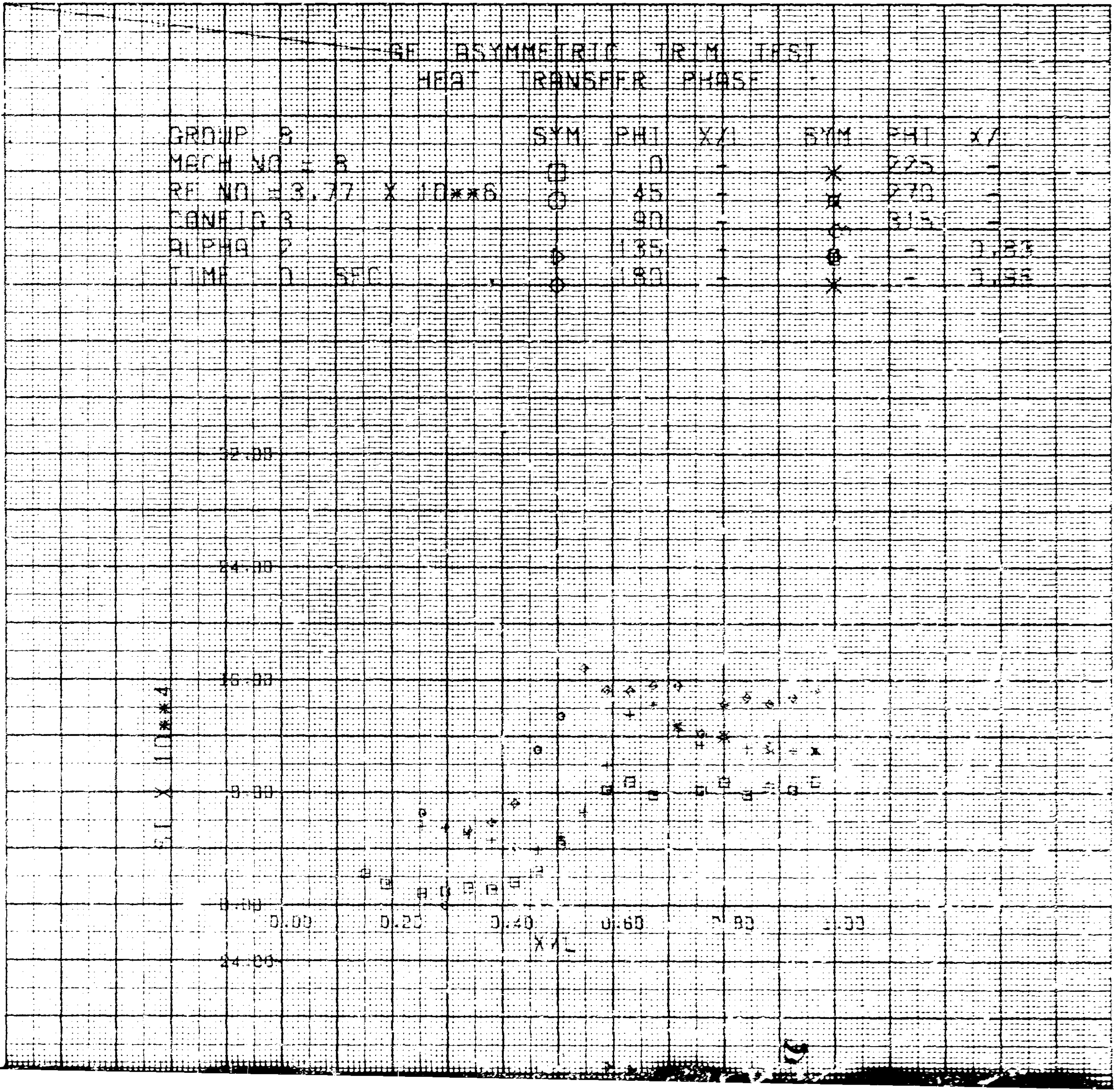
FIGURE 39
SI X 1
SI X 10**4
SI X 10**4
0.00
8.00
16.00
24.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
80.00
160.00
240.00
320.00
400.00
PHI, DEG

Figure 39

```
                                         7/16/69

                        AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                        VON KARMAN GAS DYNAMICS FACILITY
                           50 INCH HYPERSONIC TUNNEL B
                                   VT0467-000
GROUP   CONFIG    ALPHA-M     BETA-M       ALPHA-S      ROLL   ALP-C   DATE      MACH NO        PO          TO          TIME
  8        3         2.0          0          2.00          0       0     716        8.00      861.86    1336.86         .00
   T-INF      P-INF       Q-INF        V-INF       RHO-INF      MU-INF        RE/FT         RE/D          HO
 9.7019E 01  4.0279E-02  3.9[illegible]E 00  3.86[illegible]E 03  7.6542E-05  7.1108E-08  3.7737E 06  3.0804E 06  3.2035E 02

TC NO   X/L     PHI    TEMP     SLOPE       QDOT        HT          HM          HW          ST

   1   .1900      0   503.72  7.7083E 00  4.4679E-01  5.3490E-04  2.1837E-03  1.2003E 02  2.2771E-04
   2   .1687      0   454.07  1.4070E 00  3.0517E-01  3.0123E-04  1.4942E-03  1.1450E 02  1.5343E-04
   3   .2524      0   496.42  5.1951E-01  1.8514E-01  2.1742E-04  8.7572E-04  1.1919E 02  9.2337E-05
   4   .2943      0   511.83  5.6062E-01  2.0504E-01  2.4792E-04  9.4773E-04  1.2201E 02  1.0320E-04
   5   .3363      0   515.07  7.4237E-01  2.5010E-01  3.0304E-04  1.2227E-03  1.2376E 02  1.2392E-04
   6   .3783      0   518.24  7.4350E-01  2.2650E-01  2.7602E-04  1.1104E-03  1.2433E 02  1.1706E-04
   7   .4203      0   518.04  1.1227E 00  3.2624E-01  3.9784E-04  1.4005E-03  1.2447E 02  1.6876E-04
   8   .4623      0   520.79  1.2597E 00  4.4406E-01  5.9265E-04  2.3619E-03  1.2492E 02  2.5136E-04
   9   .5043      0   522.81  1.1090E 00  6.4111E-01  1.0297E-03  4.1410E-03  1.2522E 02  4.3670E-04
  10   .5463      0   529.14  2.7040E-02  7.8473E-03  9.6989E-06  3.4453E-05  1.2691E 02  4.1004E-06
  11   .5882      0   527.44  4.3342E 00  1.5775E 00  1.9444E-03  7.8181E-03  1.2457E 02  8.2464E-04
  12   .6302      0   531.39  4.2276E 00  1.6464E 00  2.0065E-03  8.3861E-03  1.2749E 02  8.6445E-04
  13   .6722      0   538.21  5.0027E 00  1.4938E 00  1.8611E-03  7.5709E-03  1.2860E 02  7.8813E-04
  14   .8822  315.0   543.24  5.6796E 00  1.3285E 00  1.6697E-03  6.7841E-03  1.3027E 02  7.0731E-04
  15   .7583      0   539.65  6.4302E 00  1.5402E 00  1.9372E-03  7.7463E-03  1.2942E 02  8.2060E-04
  16   .7996      0   540.28  5.4254E 00  1.6625E 00  2.0419E-03  8.3653E-03  1.2957E 02  8.8206E-04
  17   .8409      0   540.23  5.4075E 00  1.4839E 00  1.8500E-03  7.4640E-03  1.2956E 02  7.8723E-04
  18   .8822      0   543.77  6.1121E 00  1.5813E 00  1.9888E-03  7.9960E-03  1.3048E 02  8.4248E-04
  19   .9235      0   545.83  6.1771E 00  1.5175E 00  1.9494E-03  7.8318E-03  1.3070E 02  8.2571E-04
  20   .9648      0   545.24  6.4859E 00  1.6959E 00  2.0892E-03  8.3920E-03  1.3695E 02  8.8407E-04
  21   .2524   45.0   493.11  3.0502E 00  9.0167E-01  1.3064E-03  4.2948E-03  1.1537E 02  4.5284E-04
  22   .2943   45.0   506.53  2.4464E 00  8.4069E-01  1.0194E-03  4.1097E-03  1.2155E 02  4.3270E-04
  23   .3363   45.0   510.31  2.9754E 00  7.7410E-01  9.3435E-04  3.7605E-03  1.2245E 02  3.9052E-04
  24   .3783   45.0   512.54  2.3345E 00  7.0174E-01  8.4925E-04  3.4170E-03  1.2290E 02  3.6036E-04
  25   .4203   45.0   515.07  2.1143E 00  6.1634E-01  7.4539E-04  2.9963E-03  1.2348E 02  3.1625E-04
  26   .4623   45.0   518.24  2.2030E 00  6.1012E-01  7.6325E-04  3.0303E-03  1.2433E 02  3.1932E-04
  27   .5043   45.0   520.17  2.2446E 00  5.9606E-01  7.2807E-04  2.9247E-03  1.2479E 02  3.0881E-04
 100   .9648  315.0   551.46  7.4672E 00  1.6995E 00  2.1564E-03  8.6670E-03  1.3224E 02  9.1395E-04
  29   .5882   45.0   524.80  3.2977E 00  9.0061E-01  1.1161E-03  4.4840E-03  1.2589E 02  4.7329E-04
  30   .6302   45.0   529.62  5.1293E 00  1.3077E 00  1.7148E-03  6.8944E-03  1.2703E 02  7.2096E-04
  31   .6722   45.0   538.94  7.4620E 00  1.9388E 00  2.4128E-03  9.6950E-03  1.2929E 02  1.0223E-03
  32   .7170   45.0   542.53  8.4804E 00  2.1149E 00  2.6550E-03  1.0670E-02  1.3010E 02  1.1251E-03
  33   .7583   45.0   539.61  7.4785E 00  2.1704E 00  2.7160E-03  1.0914E-02  1.2941E 02  1.1500E-03
  34   .7996   45.0   540.86  7.4506E 00  2.0905E 00  2.6176E-03  1.0514E-02  1.2952E 02  1.1088E-03
  35   .8409   45.0   542.54  7.1995E 00  1.9478E 00  2.4459E-03  9.8271E-03  1.3011E 02  1.0362E-03
  36   .8822   45.0   544.21  6.9685E 00  1.8329E 00  2.3066E-03  9.2643E-03  1.3051E 02  9.7764E-04
  37   .9235   45.0   545.77  7.4680E 00  1.7990E 00  2.2683E-03  9.1119E-03  1.3040E 02  9.6078E-04
  38   .9648   45.0   547.31  6.9334E 00  1.6673E 00  2.1944E-03  8.4607E-03  1.3124E 02  8.9211E-04
  39   .2524   90.0   493.19  3.8117E 00  1.1200E 00  1.3324E-03  5.3675E-03  1.1839E 02  5.6596E-04
  40   .2943   90.0   505.21  3.1060E 00  1.0856E 00  1.3022E-03  5.2420E-03  1.2124E 02  5.5279E-04
  41   .3363   90.0   508.45  3.1663E 00  9.9930E-01  1.2035E-03  4.8442E-03  1.2200E 02  5.1070E-04
  42   .3783   90.0   511.33  2.8908E 00  9.1243E-01  1.1026E-03  4.4374E-03  1.2269E 02  4.6788E-04
  43   .4203   90.0   514.47  2.7219E 00  8.0653E-01  9.7603E-04  3.9274E-03  1.2343E 02  4.1411E-04
  44   .4623   90.0   515.51  2.4718E 00  7.6765E-01  9.3259E-04  3.7524E-03  1.2368E 02  3.9566E-04
  45   .5043   90.0   518.95  3.4559E 00  9.5220E-01  1.1613E-03  4.6719E-03  1.2450E 02  4.9261E-04
  46   .5463   90.0   523.09  4.4777E 00  1.2787E 00  1.5606E-03  6.3089E-03  1.2561E 02  6.6510E-04
  47   .5882   90.0   526.43  6.4078E 00  1.9101E 00  2.3511E-03  9.4544E-03  1.2627E 02  9.9689E-04
  48   .6302   90.0   530.96  9.1098E 00  2.5872E 00  3.2023E-03  1.2874E-02  1.2735E 02  1.3575E-03
  49   .6722   90.0   534.84  1.0755E 01  2.6944E 00  3.3722E-03  1.3550E-02  1.2847E 02  1.4288E-03
  50   .7170   90.0   543.09  9.9403E 00  2.3408E 00  2.9410E-03  1.1818E-02  1.3024E 02  1.2461E-03
  51   .7583   90.0   537.31  9.1042E 00  2.1632E 00  2.6988E-03  1.0846E-02  1.2884E 02  1.1436E-03
  52   .7996   90.0   538.79  8.4623E 00  2.2565E 00  2.8204E-03  1.1334E-02  1.2921E 02  1.1951E-03
  53   .8409   90.0   540.09  8.4515E 00  2.1173E 00  2.6506E-03  1.0651E-02  1.2952E 02  1.1231E-03
  54   .8822   90.0   542.54  8.4165E 00  2.1151E 00  2.6561E-03  1.0672E-02  1.3011E 02  1.1252E-03
  55   .9235   90.0   543.91  8.6241E 00  2.0749E 00  2.6102E-03  1.0486E-02  1.3044E 02  1.1057E-03
  56   .9648   90.0   544.21  8.5720E 00  2.0374E 00  2.5638E-03  1.0300E-02  1.3050E 02  1.0860E-03
  57   .2524  135.0   486.41  1.2609E 00  3.5500E-01  4.1645E-04  1.6783E-03  1.1678E 02  1.7696E-04
  58   .2943  135.0   498.24  4.3111E 00  1.3822E 00  1.6443E-03  6.6222E-03  1.1950E 02  6.9826E-04
  59   .3363  135.0   501.20  3.0997E 00  1.2624E 00  1.5071E-03  6.0680E-03  1.2029E 02  6.3988E-04
  60   .3783  135.0   504.23  3.5934E 00  1.1163E 00  1.3374E-03  5.3845E-03  1.2100E 02  5.6775E-04
  61   .4203  135.0   507.01  3.9800E 00  1.1964E 00  1.4382E-03  5.7805E-03  1.2166E 02  6.1045E-04
  62   .4623  135.0   510.28  4.5440E 00  1.3203E 00  1.5935E-03  6.4132E-03  1.2244E 02  6.7622E-04
  63   .5043  135.0   514.76  7.2662E 00  1.8566E 00  2.2529E-03  9.0650E-03  1.2350E 02  9.5583E-04
  64   .5463  135.0   519.31  1.0387E 01  2.7582E 00  3.3654E-03  1.3530E-02  1.2458E 02  1.4275E-03
  65   .5882  135.0   524.08  1.2817E 01  3.1911E 00  3.9166E-03  1.5751E-02  1.2572E 02  1.6609E-03
  66   .6302  135.0   525.94  1.1460E 01  3.1495E 00  3.8743E-03  1.5580E-02  1.2616E 02  1.6429E-03
  67   .6722  135.0   537.22  1.1846E 01  2.8488E 00  3.5537E-03  1.4282E-02  1.2884E 02  1.5059E-03
  68   .7170  135.0   539.14  1.0966E 01  2.5824E 00  3.2291E-03  1.2976E-02  1.2930E 02  1.3682E-03
  69   .7583  135.0   529.68  6.9378E 00  1.9466E 00  2.4057E-03  9.6720E-03  1.2705E 02  1.0198E-03
  70   .7996  135.0   534.72  9.2442E 00  2.6880E 00  3.3402E-03  1.3426E-02  1.2825E 02  1.4156E-03
  71   .8409  135.0   535.92  9.0004E 00  2.4799E 00  3.0885E-03  1.2413E-02  1.2853E 02  1.3089E-03
  72   .8822  135.0   537.73  9.5530E 00  2.5845E 00  3.2260E-03  1.2945E-02  1.2896E 02  1.3670E-03
  73   .9235  135.0   539.54  9.4514E 00  2.4182E 00  3.0253E-03  1.2157E-02  1.2939E 02  1.2818E-03
  74   .9648  135.0   544.31  1.0610E 01  2.5516E 00  3.2113E-03  1.2901E-02  1.3053E 02  1.3603E-03
  75   .2524  180.0   488.22  4.5292E 00  1.3160E 00  1.5471E-03  6.2341E-03  1.1721E 02  6.5734E-04
  76   .2943  180.0  1033.57  1.4862E-06  4.7652E-07  1.3606E-09  6.1073E-09  2.5029E 02  6.4397E-10
  77   .3363  180.0   503.85  3.5931E 00  1.0622E 00  1.2720E-03  5.1214E-03  1.2091E 02  5.4001E-04
  78   .3783  180.0   507.41  3.8758E 00  1.1651E 00  1.4012E-03  5.6405E-03  1.2176E 02  5.9475E-04
  79   .4203  180.0   511.25  4.4149E 00  1.4239E 00  1.7205E-03  6.9243E-03  1.2267E 02  7.3011E-04
  80   .4623  180.0   515.29  7.5473E 00  2.1553E 00  2.6170E-03  1.0530E-02  1.2363E 02  1.1103E-03
  81   .5043  180.0   519.54  1.0396E 01  2.6045E 00  3.1789E-03  1.2788E-02  1.2464E 02  1.3484E-03
  82   .5463  180.0   523.78  1.2237E 01  3.2496E 00  3.9869E-03  1.6034E-02  1.2564E 02  1.6907E-03
  83   .5882  180.0   526.67  1.1086E 01  2.9439E 00  3.6255E-03  1.4578E-02  1.2630E 02  1.5372E-03
  84   .6302  180.0   531.75  1.0978E 01  2.9152E 00  3.6118E-03  1.4520E-02  1.2754E 02  1.5310E-03
  85   .6722  180.0   544.17  1.2253E 01  2.9466E 00  3.7076E-03  1.4895E-02  1.3048E 02  1.5705E-03
  86   .7170  180.0   547.57  1.2424E 01  2.9259E 00  3.6975E-03  1.4851E-02  1.3130E 02  1.5660E-03
  87   .7583  180.0   537.08  9.4266E 00  2.3150E 00  2.8873E-03  1.1604E-02  1.2881E 02  1.2235E-03
  88   .7996  180.0   541.97  1.0357E 01  2.6981E 00  3.3858E-03  1.3603E-02  1.2997E 02  1.4344E-03
  89   .8409  180.0   543.44  1.0870E 01  2.7775E 00  3.4910E-03  1.4028E-02  1.3032E 02  1.4792E-03
  90   .8822  180.0   545.45  1.1634E 01  2.6809E 00  3.3789E-03  1.3573E-02  1.3080E 02  1.4312E-03
  91   .9235  180.0   547.29  1.1278E 01  2.7664E 00  3.4974E-03  1.4048E-02  1.3124E 02  1.4812E-03
  92   .9648  180.0   551.44  1.2372E 01  2.8511E 00  3.6208E-03  1.4540E-02  1.3223E 02  1.5332E-03
  93   .8822  225.0   546.88  9.6251E 00  2.4593E 00  3.1053E-03  1.2473E-02  1.3114E 02  1.3152E-03
  94   .9648  225.0   552.27  1.0129E 01  2.4359E 00  3.0965E-03  1.2434E-02  1.3241E 02  1.3111E-03
  95   .7170  270.0   551.95  1.0560E 01  2.3825E 00  3.0277E-03  1.2158E-02  1.3235E 02  1.2820E-03
  96   .7996  270.0   549.61  9.5324E 00  2.2445E 00  2.8439E-03  1.1422E-02  1.3179E 02  1.2043E-03
  97   .8822  270.0   551.50  8.1184E 00  2.0743E 00  2.6345E-03  1.0580E-02  1.3224E 02  1.1155E-03
  98   .9648  270.0   553.27  8.9245E 00  2.0500E 00  2.6094E-03  1.0478E-02  1.3266E 02  1.1048E-03
```

1

SH ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP B SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 8
MACH NO = 8
RE NO =3.77 X 10**6
CONFIG B
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.83
- 0.93
32.00
24.00
16.00
8.00
0.00
24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

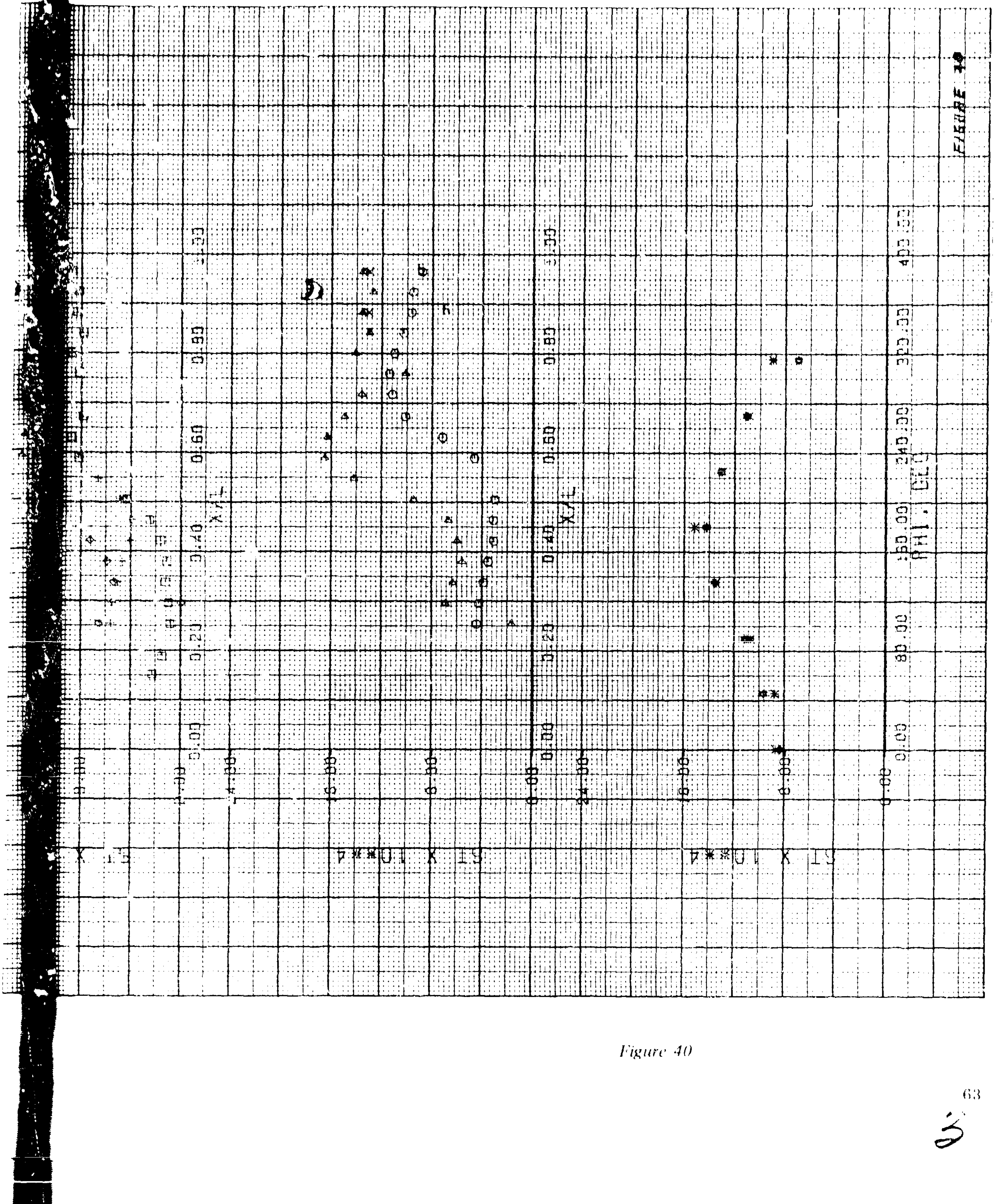


FIGURE 40
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
X/L
0.00
0.20
0.40
0.60
0.80
1.00
X 10**4

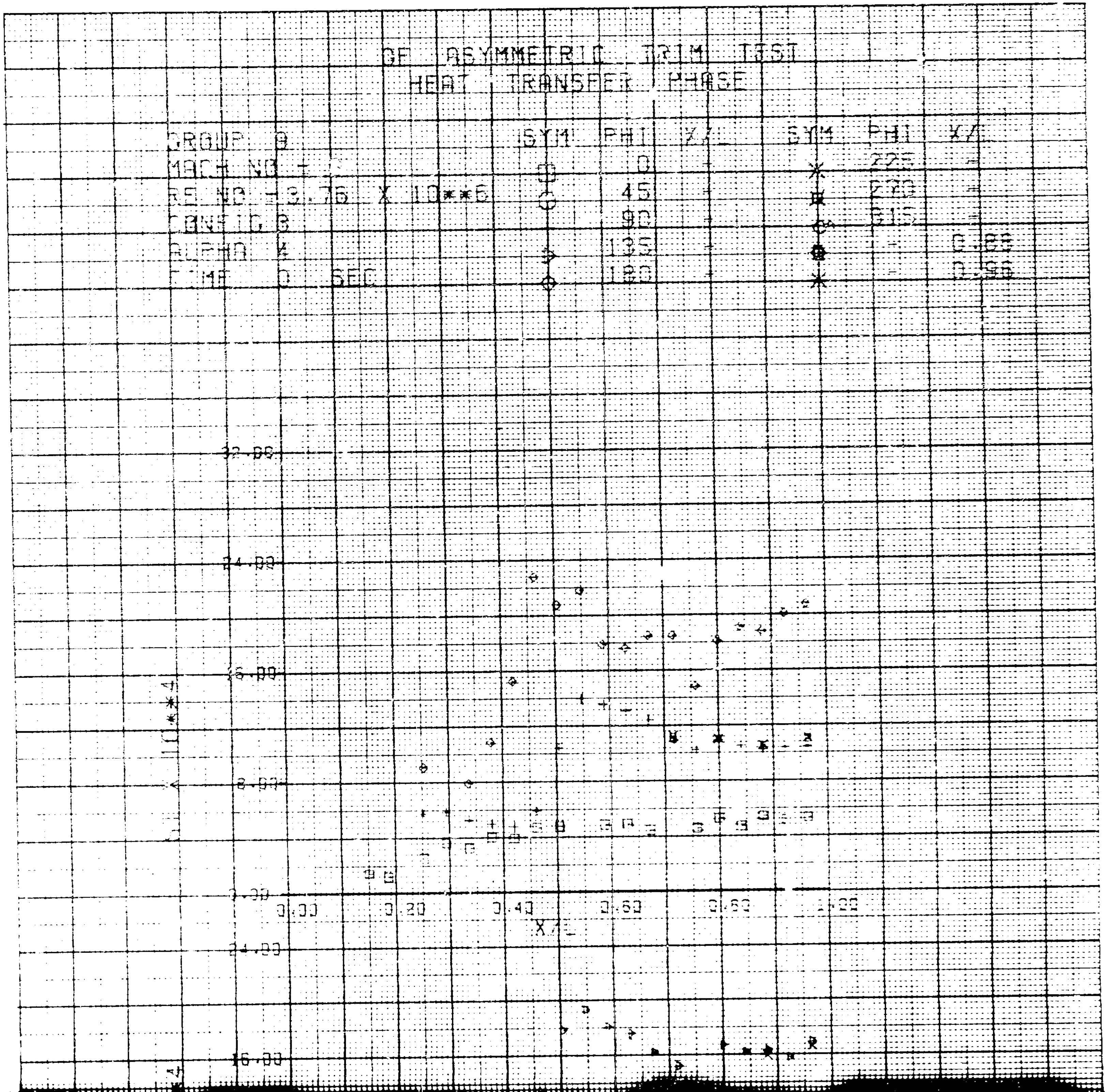
Figure 40

```
                                          7/14/69

                          AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                           VON KARMAN GAS DYNAMICS FACILITY
                             50 INCH HYPERSONIC TUNNEL B
                                      VT0967-800
 WING    CONFIG     ALPHA-M      BETA-M       ALPHA-S      ROLL    ALP-P   DATE      MACH NO       PO           TO         TIME
            3        4.89          0           4.89         0        0     716        8.00       659.16      1338.19       -.00
 T-INF            P-INF        Q-INF        V-INF        RHO-INF      MU-INF        RE/FT          HE/O           HO
 9.6 [illegible] 01  8.8002E-02  3.9425E 00  3.8601E 03  7.6141E-05  9.8707E-08  3.7647E 06  3.4533E 06  3.2809E 02

 NO.     X/L     PHI     TEMP     SLOPE        Q-STON        HT            HH           HW           ST

  1    .1036      0    519.09   7.1771E 00   2.9902E-01   7.1127E-04   1.2972E-03   1.2908E 02   1.3242E-04
  2    .1467      0    507.34   6.4926E-01   2.1067E-01   2.5356E-04   1.0207E-03   1.2175E 02   1.0794E-04
  3    .2524      0    508.07   1.4172E 00   4.7305E-01   5.7644E-04   2.3203E-03   1.2210E 02   2.4536E-04
  4    .2943      0    523.50   2.1426E 00   4.7627E-01   8.0108E-04   3.3347E-03   1.2550E 02   3.5305E-04
  5    .3363      0    526.09   1.4033E 00   4.8076E-01   7.4048E-04   2.9776E-03   1.2630E 02   3.1488E-04
  6    .3783      0    529.10   2.4785E 00   7.4505E-01   9.2085E-04   3.7025E-03   1.2591E 02   3.9153E-04
  7    .4203      0    529.27   2.4329E 00   7.3597E-01   9.0982E-04   3.6541E-03   1.2695E 02   3.8684E-04
  8    .4623      0    531.04   3.1784E 00   8.7573E-01   1.0854E-03   4.3652E-03   1.2752E 02   4.6160E-04
  9    .5043      0    532.27   3.0880E 00   8.8075E-01   1.1046E-03   4.4313E-03   1.2766E 02   4.6933E-04
 10    .5463      0    530.11   5.5502E-02   1.6703E-02   1.8196E-05   7.3140E-05   1.2715E 02   7.7360E-06
 11    .5882      0    535.80   3.2796E 00   9.0253E-01   1.1249E-03   4.5214E-03   1.2857E 02   4.7812E-04
 12    .6302      0    538.40   3.3034E 00   9.0451E-01   1.1311E-03   4.5455E-03   1.2914E 02   4.8067E-04
 13    .6722      0    538.91   3.2719E 00   8.1985E-01   1.0255E-03   4.1213E-03   1.2924E 02   4.3581E-04
 14    .6722    315.0  547.40   4.1175E 00   1.0466E 00   1.3239E-03   5.3177E-03   1.3133E 02   5.6233E-04
 15    .7583      0    545.70   3.4929E 00   8.3997E-01   1.0594E-03   4.2557E-03   1.3076E 02   4.5003E-04
 16    .7996      0    546.55   3.4329E 00   9.6319E-01   1.2167E-03   4.8875E-03   1.3104E 02   5.1604E-04
 17    .8409      0    546.09   3.3563E 00   8.5757E-01   1.0836E-03   4.3529E-03   1.3112E 02   4.6030E-04
 18    .8822      0    549.01   3.9407E 00   9.9224E-01   1.2586E-03   5.0558E-03   1.3186E 02   5.3455E-04
 19    .9235      0    551.00   3.7273E 00   9.3601E-01   1.1865E-03   4.7651E-03   1.3212E 02   5.0380E-04
 20    .9648      0    540.96   4.0146E 00   9.6595E-01   1.2239E-03   4.9158E-03   1.3164E 02   5.1984E-04
 21    .2524     45.0  500.30   2.4734E 00   7.6871E-01   9.1444E-04   3.6813E-03   1.2149E 02   3.8929E-04
 22    .2943     45.0  519.42   2.1836E 00   7.0012E-01   8.5508E-04   3.4309E-03   1.2461E 02   3.6376E-04
 23    .3363     45.0  523.24   2.4716E 00   6.2273E-01   7.6414E-04   3.0734E-03   1.2552E 02   3.2500E-04
 24    .3783     45.0  525.01   1.7904E 00   5.3036E-01   6.6284E-04   2.6625E-03   1.2594E 02   2.8155E-04
 25    .4203     45.0  527.34   1.9310E 00   5.8131E-01   6.9227E-04   2.7837E-03   1.2544E 02   2.9437E-04
 26    .4623     45.0  530.91   2.4177E 00   7.9059E-01   9.7933E-04   3.9373E-03   1.2734E 02   4.1630E-04
 27    .5043     45.0  534.25   5.4352E 00   1.4699E 00   1.8283E-03   7.3403E-03   1.2913E 02   7.7717E-04
 28    .5463    315.0  554.59   5.3827E 00   1.2944E 00   1.6519E-03   6.6378E-03   1.3298E 02   7.0140E-04
 29    .5882     45.0  538.30   7.1749E 00   1.9768E 00   2.4713E-03   9.9317E-03   1.2910E 02   1.0503E-03
 30    .6302     45.0  541.21   6.7239E 00   1.4191E 00   2.2825E-03   9.1713E-03   1.2979E 02   9.6984E-04
 31    .6722     45.0  543.01   6.9585E 00   1.7081E 00   2.1497E-03   8.6368E-03   1.3036E 02   9.1330E-04
 32    .7170     45.0  545.87   6.4029E 00   1.5314E 00   1.9328E-03   7.7642E-03   1.3090E 02   8.2104E-04
 33    .7583     45.0  547.94   5.5090E 00   1.5179E 00   1.9208E-03   7.7153E-03   1.3139E 02   8.1587E-04
 34    .7996     45.0  548.90   5.3990E 00   1.4808E 00   1.8837E-03   7.5658E-03   1.3162E 02   8.0006E-04
 35    .8409     45.0  551.01   5.0693E 00   1.3714E 00   1.7436E-03   7.0019E-03   1.3227E 02   7.4043E-04
 36    .8822     45.0  552.34   5.1139E 00   1.3451E 00   1.7139E-03   6.8820E-03   1.3268E 02   7.2776E-04
 37    .9235     45.0  554.24   5.1862E 00   1.3251E 00   1.6963E-03   6.7871E-03   1.3289E 02   7.1772E-04
 38    .9648     45.0  551.86   5.2260E 00   1.2507E 00   1.5963E-03   6.4145E-03   1.3233E 02   6.7873E-04
 39    .2524     90.0  508.35   1.7253E 00   1.1612E 00   1.3271E-03   5.3418E-03   1.2198E 02   5.6488E-04
 40    .2943     90.0  520.07   3.4580E 00   1.1367E 00   1.3552E-03   5.4515E-03   1.2476E 02   5.7649E-04
 41    .3363     90.0  522.94   1.1356E 00   9.8960E-01   1.2148E-03   4.8027E-03   1.2545E 02   5.1636E-04
 42    .3783     90.0  524.96   2.4560E 00   9.3300E-01   1.1473E-03   4.6119E-03   1.2592E 02   4.8790E-04
 43    .4203     90.0  527.48   3.0183E 00   8.9166E-01   1.0999E-03   4.4227E-03   1.2652E 02   4.6768E-04
 44    .4623     90.0  528.92   3.4661E 00   1.1078E 00   1.3689E-03   5.5039E-03   1.2687E 02   5.8202E-04
 45    .5043     90.0  534.07   7.0935E 00   1.9545E 00   2.4304E-03   9.7696E-03   1.2808E 02   1.0331E-03
 46    .5463     90.0  538.82   9.1479E 00   2.6112E 00   3.2666E-03   1.3127E-02   1.2922E 02   1.3882E-03
 47    .5882     90.0  539.37   9.0191E 00   2.5306E 00   3.1679E-03   1.2730E-02   1.2935E 02   1.3462E-03
 48    .6302     90.0  541.74   8.4611E 00   2.4415E 00   3.0655E-03   1.2317E-02   1.2992E 02   1.3025E-03
 49    .6722     90.0  544.66   9.7019E 00   2.3053E 00   2.9051E-03   1.1671E-02   1.3051E 02   1.2342E-03
 50    .7170     90.0  547.75   9.4371E 00   2.0104E 00   2.5434E-03   1.0216E-02   1.3135E 02   1.0803E-03
 51    .7583     90.0  547.25   7.7425E 00   1.8867E 00   2.3854E-03   9.5815E-03   1.3123E 02   1.0132E-03
 52    .7996     90.0  549.04   7.7327E 00   2.0144E 00   2.5527E-03   1.0253E-02   1.3166E 02   1.0842E-03
 53    .8409     90.0  550.53   7.7443E 00   1.9401E 00   2.4632E-03   9.8923E-03   1.3201E 02   1.0461E-03
 54    .8822     90.0  552.97   7.4260E 00   1.8720E 00   2.3840E-03   9.5731E-03   1.3259E 02   1.0123E-03
 55    .9235     90.0  553.05   7.8939E 00   1.8983E 00   2.4203E-03   9.7184E-03   1.3280E 02   1.0277E-03
 56    .9648     90.0  550.50   8.9060E 00   1.9253E 00   2.4442E-03   9.8143E-03   1.3200E 02   1.0380E-03
 57    .2524    135.0  503.34   1.4338E 00   4.5341E-01   5.4312E-04   2.1840E-03   1.2080E 02   2.3125E-04
 58    .2943    135.0  513.97   4.9230E 00   1.5784E 00   1.9150E-03   7.7042E-03   1.2331E 02   8.1491E-04
 59    .3363    135.0  515.51   4.4154E 00   1.4568E 00   1.7708E-03   7.1251E-03   1.2368E 02   7.5346E-04
 60    .3783    135.0  517.09   4.5410E 00   1.4106E 00   1.7180E-03   6.9120E-03   1.2405E 02   7.3093E-04
 61    .4203    135.0  519.57   5.4955E 00   1.7121E 00   2.0913E-03   8.4131E-03   1.2463E 02   8.8966E-04
 62    .4623    135.0  523.04   8.7740E 00   2.5505E 00   3.1320E-03   1.2597E-02   1.2566E 02   1.3321E-03
 63    .5043    135.0  529.90   1.1262E 01   3.3887E 00   4.1924E-03   1.6856E-02   1.2710E 02   1.7825E-03
 64    .5463    135.0  532.64   1.1765E 01   3.6553E 00   4.5344E-03   1.8229E-02   1.2761E 02   1.9277E-03
 65    .5882    135.0  534.77   1.2811E 01   3.4019E 00   4.2342E-03   1.7020E-02   1.2826E 02   1.7998E-03
 66    .6302    135.0  536.21   1.2465E 01   3.3102E 00   4.1275E-03   1.6589E-02   1.2860E 02   1.7543E-03
 67    .6722    135.0  543.01   1.2596E 01   3.0290E 00   3.8083E-03   1.5301E-02   1.3017E 02   1.6180E-03
 68    .7170    135.0  546.54   1.2022E 01   2.8312E 00   3.5673E-03   1.4311E-02   1.3050E 02   1.5155E-03
 69    .7583    135.0  538.87   7.4908E 00   2.2140E 00   2.7699E-03   1.1131E-02   1.2923E 02   1.1771E-03
 70    .7996    135.0  544.50   1.0741E 01   3.1204E 00   3.9321E-03   1.5797E-02   1.3057E 02   1.6705E-03
 71    .8409    135.0  545.30   1.0954E 01   3.0181E 00   3.8065E-03   1.5292E-02   1.3076E 02   1.6170E-03
 72    .8822    135.0  547.67   1.1241E 01   3.0412E 00   3.8470E-03   1.5452E-02   1.3113E 02   1.6341E-03
 73    .9235    135.0  549.31   1.1908E 01   2.9231E 00   3.7054E-03   1.4882E-02   1.3172E 02   1.5738E-03
 74    .9648    135.0  551.35   1.1017E 01   3.1302E 00   3.9782E-03   1.5976E-02   1.3220E 02   1.6895E-03
 75    .2524    180.0  505.41   4.4580E 00   1.7602E 00   2.1136E-03   8.5094E-03   1.2120E 02   8.9985E-04
 76    .2943    180.0  522.04  -3.3324E 01  -1.0684E 01  -1.3091E-02  -5.2657E-02   1.2523E 02  -5.5683E-03
 77    .3363    180.0  518.46   5.4872E 00   1.5030E 00   1.8345E-03   7.3805E-03   1.2438E 02   7.8047E-04
 78    .3783    180.0  521.39   6.9092E 00   2.0769E 00   2.5426E-03   1.0228E-02   1.2506E 02   1.0815E-03
 79    .4203    180.0  526.21   9.4346E 00   2.9072E 00   3.5405E-03   1.4399E-02   1.2423E 02   1.5226E-03
 80    .4623    180.0  532.77   1.5060E 01   4.3006E 00   5.3396E-03   2.1445E-02   1.2778E 02   2.2699E-03
 81    .5043    180.0  536.24   1.5585E 01   3.9042E 00   4.8685E-03   1.9567E-02   1.2461E 02   2.0692E-03
 82    .5463    180.0  537.64   1.5409E 01   4.0920E 00   5.1115E-03   2.0563E-02   1.2494E 02   2.1723E-03
 83    .5882    180.0  537.91   1.2632E 01   3.3545E 00   4.1918E-03   1.6846E-02   1.2901E 02   1.7814E-03
 84    .6302    180.0  542.04   1.2370E 01   3.2864E 00   4.1279E-03   1.6586E-02   1.2999E 02   1.7539E-03
 85    .6722    180.0  550.09   1.4201E 01   3.6150E 00   4.3365E-03   1.7416E-02   1.3205E 02   1.8417E-03
 86    .7170    180.0  553.75   1.4442E 01   3.4010E 00   4.3356E-03   1.7409E-02   1.3270E 02   1.8410E-03
 87    .7583    180.0  546.15   1.1459E 01   2.7557E 00   3.4793E-03   1.3977E-02   1.3097E 02   1.4780E-03
 88    .7996    180.0  552.15   1.2867E 01   3.3363E 00   4.2433E-03   1.7044E-02   1.3239E 02   1.8024E-03
 89    .8409    180.0  553.45   1.3736E 01   3.5096E 00   4.4724E-03   1.7959E-02   1.3271E 02   1.8991E-03
 90    .8822    180.0  555.75   1.4951E 01   3.4453E 00   4.4033E-03   1.7679E-02   1.3325E 02   1.8695E-03
 91    .9235    180.0  557.24   1.4975E 01   3.6758E 00   4.7071E-03   1.8897E-02   1.3362E 02   1.9983E-03
 92    .9648    180.0  550.71   1.4447E 01   3.7900E 00   4.8622E-03   1.9518E-02   1.3396E 02   2.0640E-03
 93    .8822    225.0  555.01   1.1456E 01   2.9270E 00   3.7413E-03   1.5021E-02   1.3327E 02   1.5884E-03
 94    .9648    225.0  550.67   1.2649E 01   3.0419E 00   3.9022E-03   1.5665E-02   1.3195E 02   1.6584E-03
 95    .7170    270.0  553.72   9.1523E 00   2.0634E 00   2.4303E-03   1.0562E-02   1.3277E 02   1.1109E-03
 96    .7996    270.0  555.70   7.4911E 00   2.0158E 00   2.5762E-03   1.0343E-02   1.3324E 02   1.0938E-03
 97    .8822    270.0  557.89   7.4357E 00   1.9254E 00   2.4476E-03   9.9061E-03   1.3376E 02   1.0475E-03
 98    .9648    270.0  557.72   8.4247E 00   2.0260E 00   2.5459E-03   1.0471E-02   1.3172E 02   1.1020E-03
```

GROUP 9 OF ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

SYM PHI X/L SYM PHI X/L


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 9
MACH NO =
RE NO = 3.76 X 10**6
CONFIG.B
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.89
- 0.96
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
H X 10**4

2

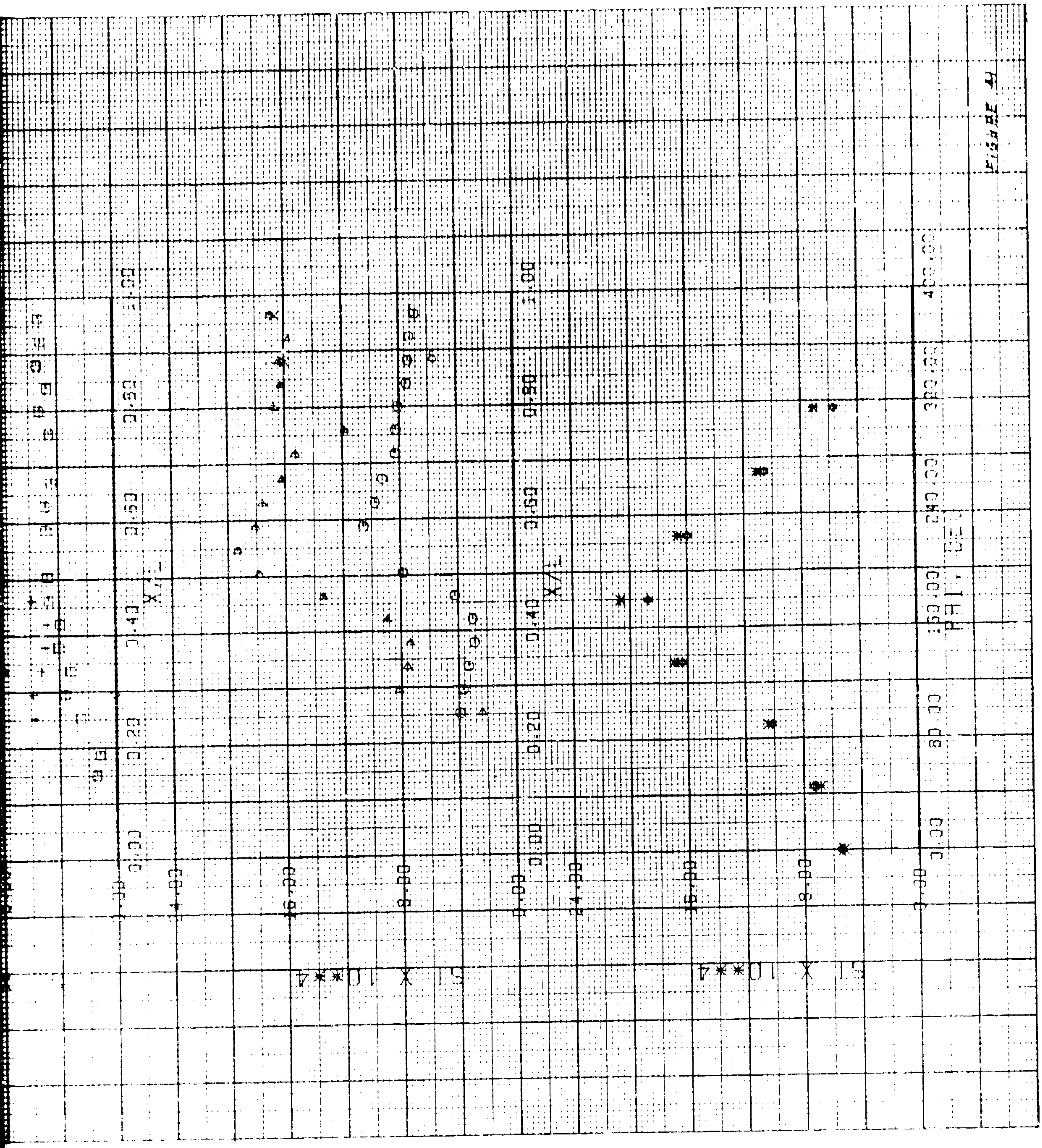


FIGURE 41
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
X/L
0.00
0.20
0.40
0.60
0.80
1.00
SI X 10**4
0.00
8.00
16.00
24.00

Figure 41

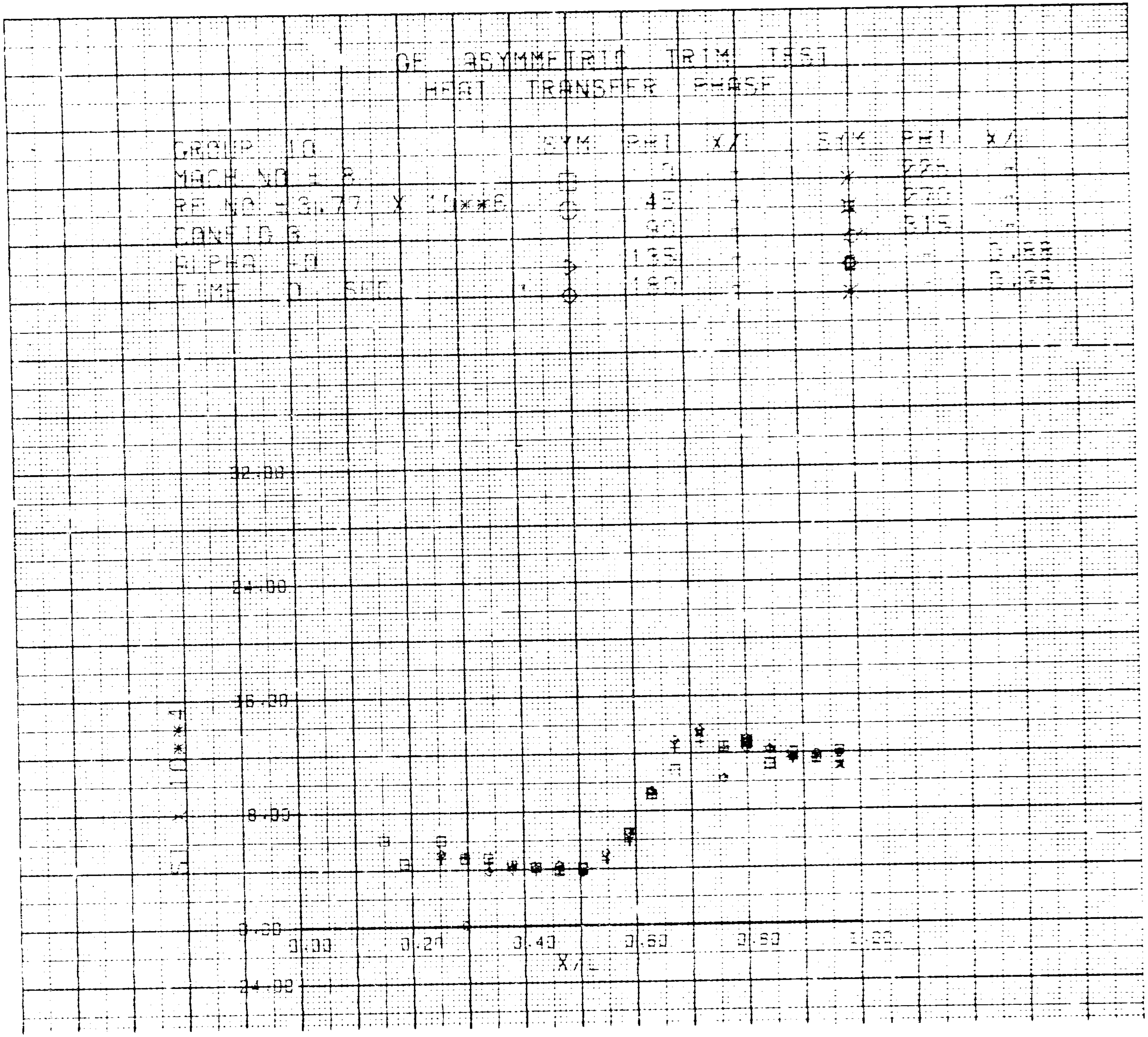
3

```
                                        7/16/69

                     AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                       VON KARMAN GAS DYNAMICS FACILITY
                        50 INCH HYPERSONIC TUNNEL H
                                V70967-800
GROUP  CONFIG    ALPHA-M     BETA-M     ALPHA-S    ROLL   ALP-P  DATE     MACH NO      PO          TO         TIME
 10      3         -.01         0          -.01       0      0    715       9.98       800.05     1338.44       .88
   T-INF        P-INF       Q-INF       V-INF       RHO-INF      MU-INF       RE/FT       RE/D         HO
 9.0700E 01  8.0695E-02  3.9446E 00  3.8695E 03  7.6266E-05  7.8085E-08  3.7676E 06  3.4567E 06  3.2015E 02

TC NO  X/L    PHI     TEMP      SLOPE       J-STUD        HT           HM          HW          ST

  1   .1000     0    511.38  7.7091E 00  1.1007F 00  [illegible]  9.0752E-03  1.2270E 02  9.9990E-04
  2   .1687     0    501.40  1.9300E 00  4.6308F-01  1.0311E-03  4.1571E-03  1.2033E 02  4.3465E-04
  3   .2524     0    505.54  1.9430E 00  1.1650F 00  1.3997E-03  5.6351E-03  1.2131F 02  5.9533E-04
  4   .2943     0    517.47  2.8631E 00  9.0367F-01  1.1007E-03  4.4283E-03  1.2413E 02  4.6783E-04
  5   .3363     0    518.54  2.8586E 00  9.0226F-01  1.1004E-03  4.4210E-03  1.2439F 02  4.6769E-04
  6   .3783     0    520.08  2.7067E 00  8.1363F-01  9.9421E-04  3.9994E-03  1.2476F 02  4.2252F-04
  7   .4203     0    520.86  2.6776E 00  7.7801F-01  9.5136E-04  3.8249E-03  1.2490F 02  4.0430F-04
  8   .4623     0    523.97  2.4353E 00  7.2611F-01  8.9152E-04  3.5056E-03  1.2569E 02  3.7480F-04
  9   .5043     0    525.81  2.7702E 00  7.5162F-01  9.2495E-04  3.7116E-03  1.2613E 02  3.9296F-04
 10   .5463     0    528.08  9.9444E-02  1.8679F-02  2.0597E-05  8.2817E-05  1.2681F 02  8.7494F-06
 11   .5882     0    532.12  4.4023E 00  1.2130F 00  1.5043E-03  6.0475E-03  1.2763F 02  6.3890F-04
 12   .6302     0    536.07  6.1308E 00  1.7149F 00  2.1373E-03  8.5901E-03  1.2857E 02  9.0752F-04
 13   .6722     0    539.57  8.1047E 00  2.0304F 00  2.5416E-03  1.0213E-02  1.2940F 02  1.0790F-03
 99   .8822  315.0   544.65  6.6811E 00  1.5737F 00  1.9825E-03  7.9645E-03  1.3061F 02  8.4142F-04
 15   .7583     0    544.45  9.4151E 00  2.3122F 00  2.9122E-03  1.1699E-02  1.3056E 02  1.2360F-03
 16   .7996     0    544.95  8.4205E 00  2.3907F 00  3.0129E-03  1.2109E-02  1.3068F 02  1.2787F-03
 17   .8409     0    544.14  8.1960E 00  2.0824F 00  2.6217E-03  1.0532E-02  1.3049E 02  1.1127F-03
 18   .8822     0    547.98  8.4584E 00  2.2193F 00  2.8076E-03  1.1277E-02  1.3140F 02  1.1914F-03
 19   .9235     0    548.07  8.5512E 00  2.1438F 00  2.7142E-03  1.0901E-02  1.3155F 02  1.1517E-03
 20   .9648     0    550.37  9.1113E 00  2.2392F 00  2.8412E-03  1.1410E-02  1.3196F 02  1.2055F-03
 21   .2524   45.0   502.47  1.9354E 00  1.0451F 00  1.2501E-03  5.0337E-03  1.2058F 02  5.3179E-04
 22   .2943   45.0   514.88  2.9475E 00  9.4502F-01  1.1672E-03  4.6162F-03  1.2348F 02  4.8760F-04
 23   .3363   45.0   516.51  2.9378E 00  8.8311F-01  1.0745E-03  4.3230E-03  1.2392E 02  4.5671E-04
 24   .3783   45.0   518.17  2.4915E 00  8.0984F-01  9.8628E-04  3.9679E-03  1.2430F 02  4.1919E-04
 25   .4203   45.0   520.96  2.5539E 00  7.8194F-01  9.0715E-04  3.6491E-03  1.2488F 02  3.8551E-04
 26   .4623   45.0   524.55  2.4998E 00  7.5750F-01  9.3071E-04  3.7431E-03  1.2583F 02  3.9544F-04
 27   .5043   45.0   527.08  2.8023E 00  6.8573F-01  8.4508E-04  3.3982E-03  1.2641E 02  3.5901E-04
100   .9648  315.0   554.21  8.4618E 00  2.0349F 00  2.5948E-03  1.0419E-02  1.3249E 02  1.1007E-03
 29   .5882   45.0   532.27  4.1630E 00  1.2023F 00  1.4913E-03  5.9950E-03  1.2765E 02  6.3335E-04
 30   .6302   45.0   536.45  6.1093E 00  1.7284F 00  2.1553E-03  8.6626E-03  1.2866E 02  9.1517E-04
 31   .6722   45.0   543.37  9.4997E 00  2.3584F 00  2.9036E-03  1.1907E-02  1.3029E 02  1.2579E-03
 32   .7170   45.0   546.57  1.0478E 01  2.6675F 00  3.1160E-03  1.2517E-02  1.3107E 02  1.3223E-03
 33   .7583   45.0   545.48  9.0140E 00  2.4836F 00  3.1321E-03  1.2582E-02  1.3081F 02  1.3292F-03
 34   .7996   45.0   546.22  8.4224E 00  2.3912F 00  3.0134E-03  1.2175E-02  1.3098E 02  1.2809E-03
 35   .8409   45.0   548.62  8.2372E 00  2.2285F 00  2.8215E-03  1.1333E-02  1.3156F 02  1.1972E-03
 36   .8822   45.0   549.98  8.8490E 00  2.1171F 00  2.6851E-03  1.0784E-02  1.3188E 02  1.1393E-03
 37   .9235   45.0   550.74  8.2170E 00  2.0995F 00  2.6654E-03  1.0704E-02  1.3206F 02  1.1309E-03
 38   .9648   45.0   551.89  8.1549E 00  1.9616F 00  2.4939E-03  1.0015E-02  1.3233E 02  1.0580E-03
 39   .2524   90.0   503.88  3.1170E 00  9.2167F-01  1.1043E-03  4.4461E-03  1.2090F 02  4.6971E-04
 40   .2943   90.0   510.19  2.4938E 00  9.2781F-01  1.1284E-03  4.5401E-03  1.2304F 02  4.7965E-04
 41   .3363   90.0   518.21  2.6901E 00  8.4908F-01  1.0352E-03  4.1647E-03  1.2432E 02  4.3998E-04
 42   .3783   90.0   519.89  2.9523E 00  8.0557F-01  9.8414E-04  3.9589E-03  1.2472F 02  4.1825F-04
 43   .4203   90.0   522.87  2.4111E 00  7.1273F-01  8.7364E-04  3.5139E-03  1.2537E 02  3.7123F-04
 44   .4623   90.0   523.41  2.1966E 00  6.8238F-01  8.3722E-04  3.3672E-03  1.2556E 02  3.5574E-04
 45   .5043   90.0   526.21  2.4695E 00  7.0798F-01  8.7165E-04  3.5052E-03  1.2622E 02  3.7031F-04
 46   .5463   90.0   529.71  2.9994E 00  8.5653F-01  1.0591E-03  4.2583E-03  1.2706E 02  4.4987F-04
 47   .5882   90.0   531.28  3.9065E 00  1.0961F 00  1.3578E-03  5.4588E-03  1.2741F 02  5.7670E-04
 48   .6302   90.0   536.76  6.1772E 00  1.7020F 00  2.1178E-03  8.5174E-03  1.2825F 02  8.9930F-04
 49   .6722   90.0   542.18  9.5886E 00  2.3664F 00  2.8966E-03  1.1618E-02  1.3002E 02  1.2295F-03
 50   .7170   90.0   546.34  1.0062E 01  2.3694F 00  2.9913E-03  1.2019E-02  1.3101E 02  1.2694E-03
 51   .7583   90.0   542.88  8.8073E 00  2.2943F 00  2.8839E-03  1.1587E-02  1.3019F 02  1.2241E-03
 52   .7996   90.0   544.74  9.0958E 00  2.3695F 00  2.9854E-03  1.1993E-02  1.3064F 02  1.2671F-03
 53   .8409   90.0   545.51  8.9490E 00  2.2419F 00  2.8275E-03  1.1358E-02  1.3082F 02  1.2000E-03
 54   .8822   90.0   547.34  8.8111E 00  2.1624F 00  2.7340E-03  1.0982E-02  1.3125E 02  1.1602E-03
 55   .9235   90.0   547.94  8.8660F 00  2.1321F 00  2.6970E-03  1.0833E-02  1.3138E 02  1.1444F-03
 56   .9648   90.0   547.99  8.6845E 00  2.0884F 00  2.6421E-03  1.0612E-02  1.3141E 02  1.1211E-03
 57   .2524  135.0   496.66  9.0146E-01  2.6648F-01  3.1657E-04  1.2751E-03  1.1921F 02  1.3471E-04
 58   .2943  135.0   508.89  2.9839E 00  9.5669F-01  1.1522E-03  4.6378E-03  1.2192F 02  4.8996E-04
 59   .3363  135.0   510.94  2.6467E 00  8.9852F-01  1.0858E-03  4.3701E-03  1.2208E 02  4.6169E-04
 60   .3783  135.0   513.07  2.5680E 00  7.9151F-01  9.5897E-04  3.8591E-03  1.2310E 02  4.0770E-04
 61   .4203  135.0   514.85  2.6051E 00  7.8310F-01  9.5062E-04  3.8252E-03  1.2348E 02  4.0411E-04
 62   .4623  135.0   516.89  2.4143E 00  7.0150F-01  8.5387E-04  3.4355E-03  1.2401E 02  3.6294E-04
 63   .5043  135.0   519.54  2.4702E 00  6.8225F-01  8.3317E-04  3.3517E-03  1.2465E 02  3.5409E-04
 64   .5463  135.0   521.68  3.1558E 00  8.3803F-01  1.0260E-03  4.1271E-03  1.2515E 02  4.3601F-04
 65   .5882  135.0   524.84  4.3444E 00  1.1536F 00  1.4180E-03  5.7027E-03  1.2590E 02  6.0246E-04
 66   .6302  135.0   528.52  6.3012E 00  1.6949F 00  2.0922E-03  8.4120E-03  1.2677E 02  8.8876E-04
 67   .6722  135.0   538.67  9.1845E 00  2.2569F 00  2.8209E-03  1.1318E-02  1.2913E 02  1.1977E-03
 68   .7170  135.0   541.24  1.0357E 01  2.4390F 00  3.0594E-03  1.2293E-02  1.2980E 02  1.2987F-03
 69   .7583  135.0   534.43  6.1715E 00  1.7877F 00  2.2235E-03  8.9375E-03  1.2818F 02  9.4421E-04
 70   .7996  135.0   538.94  8.7449E 00  2.5424F 00  3.1800E-03  1.2779E-02  1.2925E 02  1.3500E-03
 71   .8409  135.0   539.86  7.7844E 00  2.1393F 00  2.6789E-03  1.0745E-02  1.2947F 02  1.1373E-03
 72   .8822  135.0   541.01  8.2778E 00  2.2395F 00  2.8084E-03  1.1294E-02  1.2974F 02  1.1922F-03
 73   .9235  135.0   542.39  8.6011E 00  2.0888F 00  2.6216E-03  1.0532E-02  1.3007E 02  1.1127E-03
 74   .9648  135.0   546.74  8.8783E 00  2.1350F 00  2.6968E-03  1.0833E-02  1.3111E 02  1.1444E-03
 75   .2524  180.0   495.13  3.4144E 00  9.9209F-01  1.1764E-03  4.7388E-03  1.1805E 02  5.0064E-04
 76   .2943  180.0  1033.52  1.4862E-06  4.7652F-07  1.5628E-09  6.1149E-09  2.5029E 02  6.4613E-10
 77   .3363  180.0   512.79  2.4921E 00  7.3669F-01  8.9215E-04  3.5903E-03  1.2301E 02  3.7930E-04
 78   .3783  180.0   515.43  2.5332E 00  7.6147F-01  9.2523E-04  3.7228E-03  1.2366E 02  3.9330E-04
 79   .4203  180.0   517.99  2.5886E 00  7.6521F-01  9.3267E-04  3.7523E-03  1.2427E 02  3.9641E-04
 80   .4623  180.0   520.74  2.8190E 00  8.0473F-01  9.8414E-04  3.9587E-03  1.2492F 02  4.1823E-04
 81   .5043  180.0   523.57  2.8326E 00  7.0963F-01  8.7080E-04  3.5023E-03  1.2558F 02  3.7000E-04
 82   .5463  180.0   526.40  3.5405E 00  9.5346F-01  1.1742E-03  4.7217E-03  1.2627E 02  4.9883F-04
 83   .5882  180.0   529.19  4.9565E 00  1.2203F 00  1.5079E-03  6.0627E-03  1.2692F 02  6.4051E-04
 84   .6302  180.0   534.49  6.4577E 00  1.7680F 00  2.1991E-03  8.8303E-03  1.2819F 02  9.3384E-04
 85   .6722  180.0   544.94  9.0515E 00  2.3931   00  3.0160E-03  1.2116E-02  1.3068F 02  1.2800E-03
 86   .7170  180.0   549.17  1.0698E 01  2.5194F 00  3.1920E-03  1.2820E-02  1.3169E 02  1.3544E-03
 87   .7583  180.0   542.13  7.9200E 00  1.9046F 00  2.3918E-03  9.6100E-03  1.3001E 02  1.0153E-03
 88   .7996  180.0   546.17  8.7536E 00  2.2803F 00  2.8782E-03  1.1562E-02  1.3097F 02  1.2215E-03
 89   .8409  180.0   546.81  9.9155E 00  2.2780F 00  2.8777E-03  1.1559E-02  1.3113E 02  1.2212F-03
 90   .8822  180.0   544.14  9.1333E 00  2.1508F 00  2.7214E-03  1.0931E-02  1.3144E 02  1.1548E-03
 91   .9235  180.0   549.76  8.6582E 00  2.1990F 00  2.7881E-03  1.1198E-02  1.3182F 02  1.1830F-03
 92   .9648  180.0   553.31  9.5218E 00  2.1942F 00  2.7948E-03  1.1222E-02  1.3268F 02  1.1856F-03
 93   .8822  225.0   549.91  8.4250E 00  2.1527F 00  2.7300E-03  1.0964E-02  1.3186F 02  1.1583F-03
 94   .9648  225.0   554.32  8.5582E 00  2.0581F 00  2.6247E-03  1.0539E-02  1.3291F 02  1.1134F-03
 95   .7170  270.0   553.41  1.0896E 01  2.4565F 00  3.1293E-03  1.2565E-02  1.3270E 02  1.3275F-03
 96   .7996  270.0   552.93  8.8695E 00  2.3553F 00  2.9984E-03  1.2040E-02  1.3250F 02  1.2720F-03
 97   .8822  270.0   554.16  8.4194E 00  2.1513F 00  2.7429E-03  1.1013E-02  1.3287F 02  1.1635F-03
 98   .9648  270.0   555.76  8.4634E 00  2.0353F 00  2.6004E-03  1.0440E-02  1.3326E 02  1.1030F-03
```

GROUP 10 OF ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

SYM PHI X/L


OF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 10
MACH NO = 8
RE NO = 3.77 X 10**6
CONFIG 6
ALPHA = 0
TIME = 0. SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.88
32.00
24.00
16.00
8.00
0.00
-8.00
H*10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

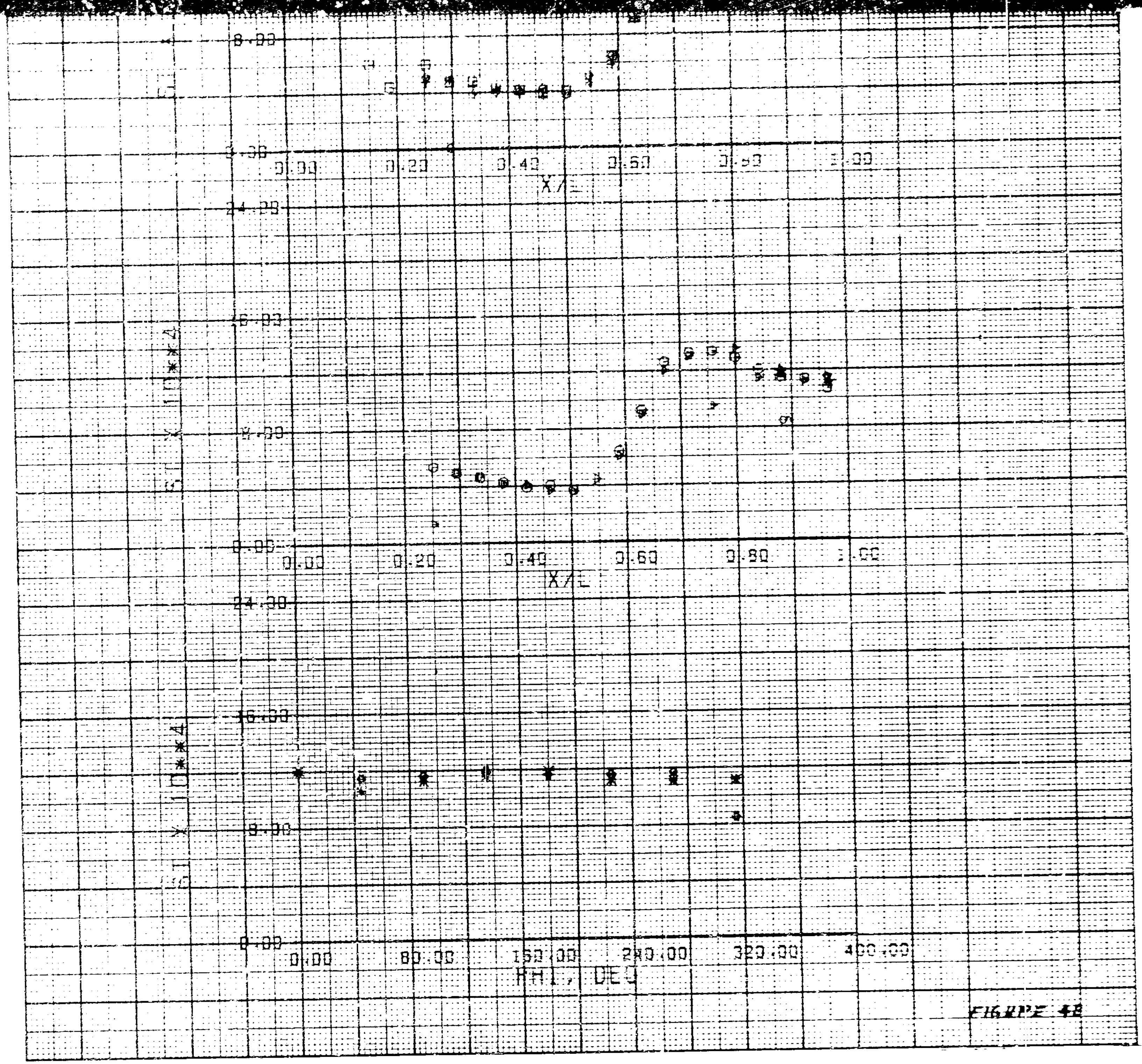
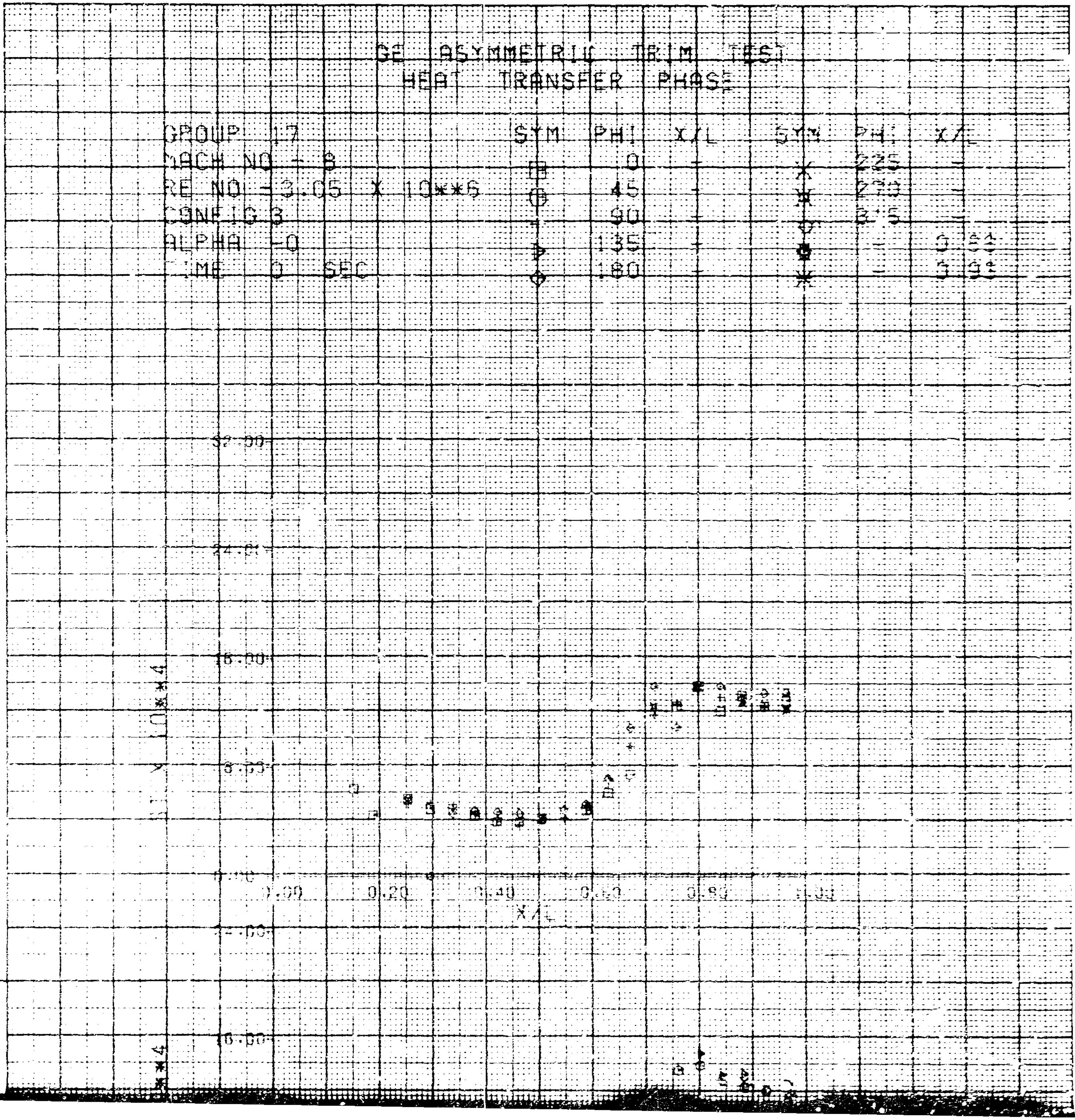
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
8.00
0.00
0.00
80.00
160.00
240.00
320.00
400.00
PHI, DEG
X 10**4
X 10**4
FIGURE 42

Figure 42

3

```
                                         [illegible]

                          AEDC, ARO, INC., ARNOLD AFS, TENNESSEE
                            VON KARMAN GAS DYNAMICS FACILITY
                             50 INCH HYPERSONIC TUNNEL B
                                      [illegible]
GROUP    CONFIG     ALPHA-M      BETA-M       ALPHA-S      ROLL    [illegible]  DATE     MACH NO      PO          TO          TIME
 17        [illegible]   -.01         0            -.01          0         0      7/1[illegible]     8.00       672.67      1368.91      -.00
 T-INF       P-INF        Q-INF        V-INF        RHO-INF      MU-INF        RE/FT        RE/D         HO
[illegible]  6.0901E-02  3.0[illegible] 00  3.8177E 03  6.09[illegible]E-05  7.6362E-08  3.0[illegible] 06  2.7952E 06  3.2652E 02

TC NO    X/L     PHI    TEMP      SLOPE        Q-DOT         HT           STN          HW           ST

  1    [illegible]   0    511.38   6.1000E 00   9.9390E-01   1.1982E-03   4.8210E-03   1.2270E 02   8.88[illegible]E-04
  2    .1467     0    501.02   3.0793E 00   6.7625E-01   8.3706E-04   3.3741E-03   1.2024E 02   6.5098E-04
  3    .2524     0    504.58   2.4939E 00   8.5547E-01   1.0636E-03   4.2849E-03   1.2109E 02   5.7291E-04
  4    .2941     0    519.37   2.1120E 00   7.2994E-01   9.2456E-04   3.7243E-03   1.2466E 02   4.9762E-04
  5    .3363     0    522.77   2.2418E 00   7.2019E-01   9.1610E-04   3.6900E-03   1.2549E 02   4.9290E-04
  6    .3783     0    523.57   2.1589E 00   6.6048E-01   8.2636E-04   3.3284E-03   1.2559E 02   4.4446E-04
  7    .4203     0    522.87   2.0233E 00   5.8788E-01   7.4771E-04   3.0172E-03   1.2538E 02   4.0237E-04
  8    .4623     0    524.60   2.1204E 00   5.8603E-01   7.4759E-04   3.0114E-03   1.2501E 02   4.2226E-04
  9    .5043     0    524.52   2.3919E 00   6.2006E-01   7.9049E-04   3.1842E-03   1.2592E 02   4.2536E-04
 10    .5463     0    527.67  -1.6285E-02  -6.4975E-03  -1.0405E-05  -4.3914E-05   1.2704E 02  -5.8059E-06
 11    .5882     0    526.14   2.6602E 00   7.0705E-01   9.0331E-04   3.6386E-03   1.2622E 02   4.8601E-04
 12    [illegible]   0    527.21   3.3123E 00   8.9610E-01   1.1464E-03   4.6170E-03   1.2644E 02   6.1676E-04
 13    [illegible]   0    527.33   4.3397E 00   1.0872E 00   1.3910E-03   5.60[illegible]E-03   1.2649E 02   7.4835E-04
 14    [illegible] 315.0    542.10   6.9242E 00   1.8037E 00   2.3523E-03   9.4663E-03   1.3000E 02   1.2645E-03
 15    [illegible]   0    537.42   7.4914E 00   1.8015E 00   2.3351E-03   9.3995E-03   1.2889E 02   1.2556E-03
 16    [illegible]   0    539.44   7.1452E 00   2.0044E 00   2.6006E-03   1.0467E-02   1.29[illegible]E 02   1.4000E-03
 17    [illegible]   0    538.05   6.4234E 00   1.7434E 00   2.2640E-03   9.1120E-03   1.2923E 02   1.2173E-03
 18    .9412     0    541.34   7.5767E 00   1.8974E 00   2.4724E-03   9.9500E-03   1.2943E 02   1.3291E-03
 19    .9235     0    540.01   7.1511E 00   1.7915E 00   2.3299E-03   9.3775E-03   1.2950E 02   1.2526E-03
 20    .9664     0    537.28   7.7123E 00   1.8347E 00   2.4035E-03   9.[illegible]E-03   1.2885E 02   1.2924E-03
 21    .2524   45.0    502.11   2.4740E 00   8.4841E-01   1.0516E-03   4.2411E-03   1.2050E 02   5.6652E-04
 22    .2941   45.0    517.04   2.4587E 00   7.5626E-01   9.5507E-04   3.8497E-03   1.2409E 02   5.1411E-04
 23    .3363   45.0    521.43   2.1108E 00   6.9443E-01   8.8206E-04   3.5517E-03   1.2508E 02   4.7474E-04
 24    .3783   45.0    522.04   2.1213E 00   6.3760E-01   8.1040E-04   3.2649E-03   1.2526E 02   4.3612E-04
 25    .4203   45.0    522.67   2.0740E 00   6.0286E-01   7.6671E-04   3.0887E-03   1.2537E 02   4.1259E-04
 26    .4623   45.0    524.99   2.1219E 00   5.9536E-01   7.5942E-04   3.0590E-03   1.2599E 02   4.0862E-04
 27    .5043   45.0    525.76   2.1675E 00   5.7557E-01   7.3603E-04   2.9[illegible]E-03   1.2611E 02   3.9542E-04
 28    .1640  315.0    541.04   7.6942E 00   1.7030E 00   2.2263E-03   8.9350E-03   1.2989E 02   1.1936E-03
 29    .5882   45.0    527.41   2.4737E 00   7.3660E-01   9.4266E-04   3.7946E-03   1.2657E 02   5.0714E-04
 30    .6302   45.0    528.72   1.9246E 00   9.5350E-01   1.2222E-03   4.9222E-03   1.2682E 02   6.5749E-04
 31    .6722   45.0    530.08   5.3002E 00   1.0710E 00   1.3718E-03   5.7319E-03   1.2728E 02   7.3924E-04
 32    .7170   45.0    534.97   7.2601E 00   1.7097E 00   2.2090E-03   8.4974E-03   1.2830E 02   1.1880E-03
 33    .7583   45.0    535.48   7.1445E 00   1.9605E 00   2.5571E-03   1.0296E-02   1.2928E 02   1.3748E-03
 34    .7996   45.0    541.45   7.1694E 00   2.0116E 00   2.6211E-03   1.0556E-02   1.2935E 02   1.4098E-03
 35    .8409   45.0    541.51   6.4760E 00   1.8604E 00   2.4307E-03   9.7813E-03   1.3034E 02   1.3065E-03
 36    .8822   45.0    544.04   6.7495E 00   1.7750E 00   2.3207E-03   9.3382E-03   1.3046E 02   1.2476E-03
 37    .9235   45.0    542.74   6.4009E 00   1.7377E 00   2.2681E-03   9.1272E-03   1.3016E 02   1.2192E-03
 38    .9640   45.0    539.96   6.7337E 00   1.6193E 00   2.1058E-03   8.4745E-03   1.2949E 02   1.1321E-03
 39    .2524   90.0    503.60   2.4757E 00   7.9097E-01   9.8229E-04   3.9613E-03   1.2087E 02   5.2916E-04
 40    .2941   90.0    510.21   2.2296E 00   7.7897E-01   9.6516E-04   2.9698E-03   1.2432E 02   5.3027E-04
 41    .3363   90.0    522.29   2.3965E 00   7.2460E-01   9.2166E-04   3.7123E-03   1.2529E 02   4.9538E-04
 42    .3783   90.0    522.54   2.1167E 00   6.6769E-01   8.4879E-04   3.4194E-03   1.2535E 02   4.5676E-04
 43    .4203   90.0    522.68   2.3545E 00   6.0734E-01   7.7266E-04   3.1127E-03   1.2543E 02   4.1579E-04
 44    .4623   90.0    522.55   1.7298E 00   5.3586E-01   6.8142E-04   2.7452E-03   1.2535E 02   3.6670E-04
 45    .5043   90.0    524.32   2.1891E 00   6.0288E-01   7.68[illegible]E-04   3.0953E-03   1.2577E 02   4.1347E-04
 46    .5463   90.0    527.20   2.1820E 00   6.2335E-01   7.9779E-04   3.2120E-03   1.2647E 02   4.2905E-04
 47    .5882   90.0    527.29   2.5819E 00   7.2443E-01   9.2683E-04   3.7329E-03   1.2646E 02   4.9863E-04
 48    .6302   90.0    528.29   3.4076E 00   1.0160E 00   1.3016E-03   5.2419E-03   1.2672E 02   7.0021E-04
 49    .6722   90.0    530.89   5.4965E 00   1.3745E 00   1.7682E-03   7.1201E-03   1.2722E 02   9.5109E-04
 50    .7170   90.0    535.01   7.2445E 00   1.7050E 00   2.2044E-03   8.8748E-03   1.2831E 02   1.1855E-03
 51    .7583   90.0    537.12   6.9998E 00   1.8234E 00   2.3626E-03   9.5105E-03   1.2882E 02   1.2704E-03
 52    .7996   90.0    540.38   7.7863E 00   2.0203E 00   2.6392E-03   1.0622E-02   1.2959E 02   1.4189E-03
 53    .8409   90.0    541.11   7.6259E 00   1.8854E 00   2.4556E-03   9.8820E-03   1.2977E 02   1.3201E-03
 54    .8822   90.0    542.04   7.4340E 00   1.8268E 00   2.3795E-03   9.5751E-03   1.2999E 02   1.2792E-03
 55    .9235   90.0    540.19   7.4820E 00   1.7802E 00   2.3158E-03   9.3254E-03   1.2955E 02   1.2450E-03
 56    .9640   90.0    535.66   7.3084E 00   1.7559E 00   2.2711E-03   9.1420E-03   1.2850E 02   1.2213E-03
 57    .2524  135.0    499.04   6.6[illegible]E-01   1.9557E-01   2.4198E-04   9.7607E-04   1.1977E 02   1.3038E-04
 58    .2941  135.0    511.54   2.6460E 00   8.1628E-01   1.0237E-03   4.1266E-03   1.2274E 02   5.5123E-04
 59    .3363  135.0    515.14   2.4470E 00   7.7259E-01   9.7331E-04   3.9227E-03   1.2359E 02   5.2398E-04
 60    .3783  135.0    514.67   2.7062E 00   6.5535E-01   8.6289E-04   3.4777E-03   1.2348E 02   4.6455E-04
 61    .4203  135.0    514.19   2.7471E 00   7.0376E-01   8.8552E-04   3.5690E-03   1.2337E 02   4.7675E-04
 62    .4623  135.0    515.20   2.1760E 00   6.3225E-01   7.9558E-04   3.2104E-03   1.2361E 02   4.2884E-04
 63    .5043  135.0    517.28   2.1456E 00   5.8909E-01   7.4317E-04   2.9988E-03   1.2410E 02   4.0058E-04
 64    .5463  135.0    518.52   2.4585E 00   6.5205E-01   8.2598E-04   3.3293E-03   1.2439E 02   4.4459E-04
 65    .5882  135.0    520.09   2.3540E 00   7.6443E-01   9.3443E-04   4.0067E-03   1.2471E 02   5.3521E-04
 66    .6302  135.0    521.32   3.4710E 00   1.0547E 00   1.3392E-03   5.3943E-03   1.2508E 02   7.2089E-04
 67    .6722  135.0    525.08   5.7240E 00   1.3777E 00   1.7595E-03   7.0849E-03   1.2614E 02   9.4805E-04
 68    .7170  135.0    529.39   7.4611E 00   1.7570E 00   2.2540E-03   9.0749E-03   1.2698E 02   1.2125E-03
 69    .7583  135.0    528.59   5.1371E 00   1.4434E 00   1.8472E-03   7.4390E-03   1.2679E 02   9.9369E-04
 70    .7996  135.0    533.92   7.4308E 00   2.1591E 00   2.7860E-03   1.1217E-02   1.2805E 02   1.4983E-03
 71    .8409  135.0    534.97   6.9630E 00   1.9243E 00   2.4860E-03   1.0006E-02   1.2836E 02   1.3369E-03
 72    .8822  135.0    535.11   7.1797E 00   1.9424E 00   2.5102E-03   1.0106E-02   1.2834E 02   1.3499E-03
 73    .9235  135.0    536.77   7.7160E 00   1.7719E 00   2.2870E-03   9.2070E-03   1.2815E 02   1.2299E-03
 74    .9646  135.0    534.33   7.4214E 00   1.8320E 00   2.3662E-03   9.5242E-03   1.2815E 02   1.2725E-03
 75    .2524  180.0    497.21   2.4739E 00   8.5408E-01   1.0645E-03   4.2945E-03   1.1934E 02   5.7367E-04
 76    .2941  180.0   -110.74  -1.1540E-14  -3.7020E-15  -2.5967E-18  -1.0018E-17  -2.1025E 01  -1.4477E-18
 77    .3363  180.0    513.80   2.2914E 00   6.7756E-01   8.5406E-04   3.4419E-03   1.237[illegible]E 02   4.5777E-04
 78    .3783  180.0    516.30   2.3634E 00   7.1693E-01   8.9641E-04   3.6125E-03   1.2389E 02   4.8255E-04
 79    .4203  180.0    517.31   2.4667E 00   6.9372E-01   8.7634E-04   3.5319E-03   1.2411E 02   4.7173E-04
 80    .4623  180.0    518.31   2.3026E 00   6.7467E-01   8.5337E-04   3.4387E-03   1.2436E 02   4.5933E-04
 81    .5043  180.0    519.40   2.4677E 00   6.1320E-01   7.7668E-04   3.1295E-03   1.2460E 02   4.1603E-04
 82    .5463  180.0    520.81   2.4058E 00   7.0703E-01   8.9415E-04   3.6146E-03   1.2494E 02   4.8337E-04
 83    .5882  180.0    522.50   2.9164E 00   7.7445E-01   9.8479E-04   3.9673E-03   1.2534E 02   5.2995E-04
 84    .6302  180.0    525.48   1.9410E 00   1.1469E 00   1.3357E-03   5.3851E-03   1.2603E 02   7.1064E-04
 85    .6722  180.0    531.07   6.4647E 00   1.5787E 00   2.0350E-03   8.1741E-03   1.2751E 02   1.0924E-03
 86    .7170  180.0    535.07   8.1690E 00   2.0057E 00   2.5945E-03   1.0445E-02   1.2852E 02   1.3952E-03
 87    .7583  180.0    533.95   6.5810E 00   1.5826E 00   2.0422E-03   8.2219E-03   1.2806E 02   1.0963E-03
 88    .7996  180.0    538.69   7.4007E 00   1.9767E 00   2.5664E-03   1.0330E-02   1.2519E 02   1.3790E-03
 89    .8409  180.0    539.39   7.4612E 00   2.0035E 00   2.6036E-03   1.0679E-02   1.2936E 02   1.3998E-03
 90    .8822  180.0    540.81   4.1311E 00   1.8737E 00   2.4369E-03   9.8080E-03   1.2950E 02   1.3101E-03
 91    .9235  180.0    539.96   7.8310E 00   1.9223E 00   2.3999E-03   1.0061E-02   1.2929E 02   1.3440E-03
 92    .9644  180.0    539.60   8.1915E 00   1.9342E 00   2.5142E-03   1.0155E-02   1.29[illegible]E 02   1.3517E-03
 93    [illegible] 225.0    542.19   7.2271E 00   1.8468E 00   2.4081E-03   9.6912E-03   1.3000E 02   1.2945E-03
 94    [illegible] 225.0    540.61   7.4454E 00   1.7905E 00   2.3305E-03   9.3794E-03   1.2965E 02   1.2529E-03
 95    [illegible] 270.0    5[illegible].01   7.9127E 00   1.7866E 00   2.3293E-03   9.3745E-03   1.2979E 02   1.2522E-03
 96    [illegible] 270.0    547.08   7.4275E 00   1.7724E 00   2.5890E-03   1.0416E-02   1.3119E 02   1.3914E-03
 97    [illegible] 270.0    547.91   7.4787E 00   1.8087E 00   2.3767E-03   9.5516E-03   1.3119E 02   1.2732E-03
 98    [illegible] 270.0    542.77   7.2613E 00   1.7662E 00   2.2792E-03   9.1[illegible]E-03   1.3015E 02   1.2252E-03
```

GE 25 ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 17
MACH NO = 8
RE NO = 3.05 X 10**6
CONFIG 3
ALPHA =0
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.94
- 0.94
32.00
24.00
16.00
8.00
0.00
-8.00
-16.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

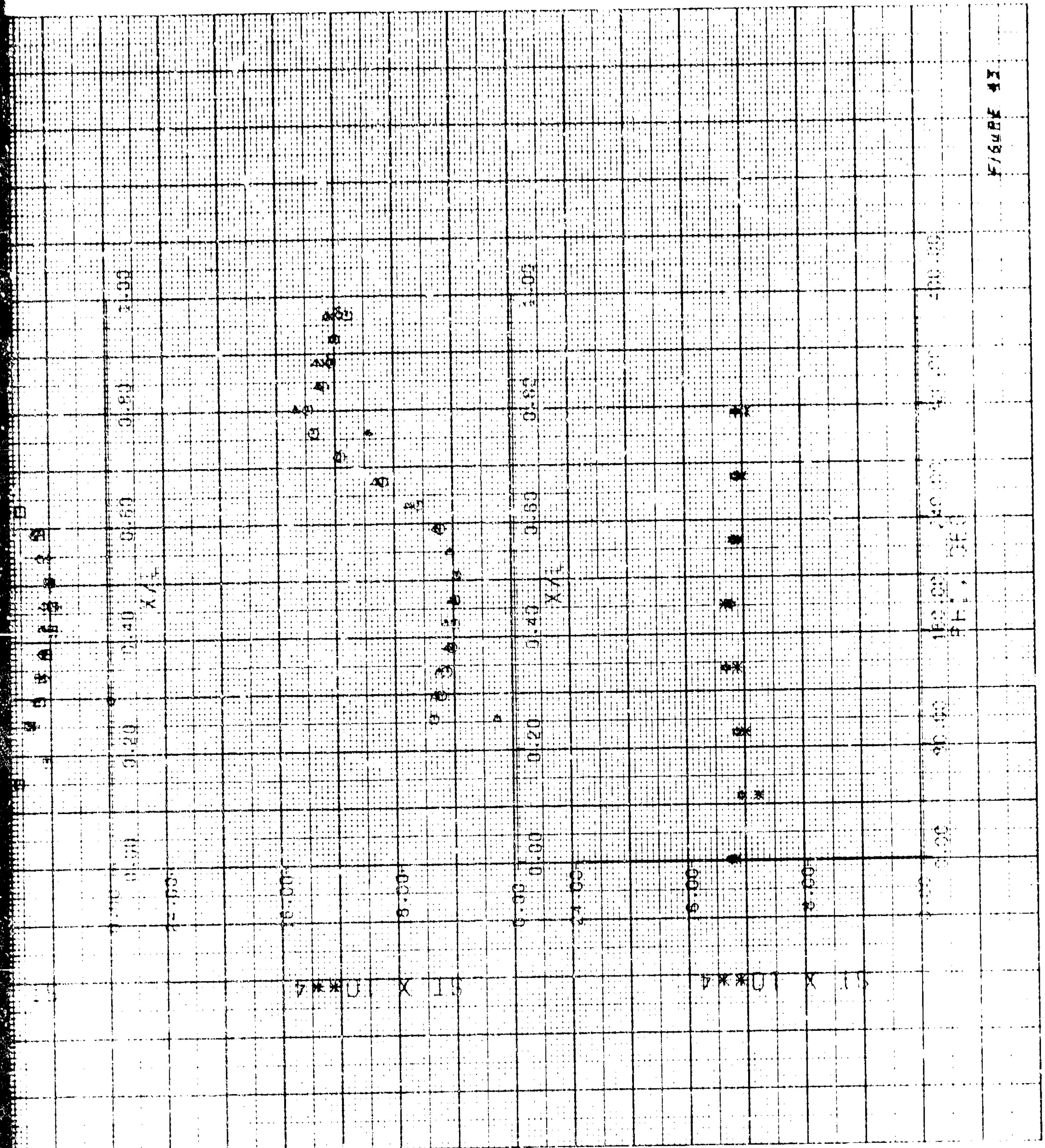


FIGURE 43
X/L
X/L
PHI, DEG
U X 10**4
U X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
0.00
0.20
0.40
0.60
0.80
1.00
0.00
90.00
180.00
270.00
360.00
4.00
6.00
8.00
4.00
6.00
8.00

Figure 43

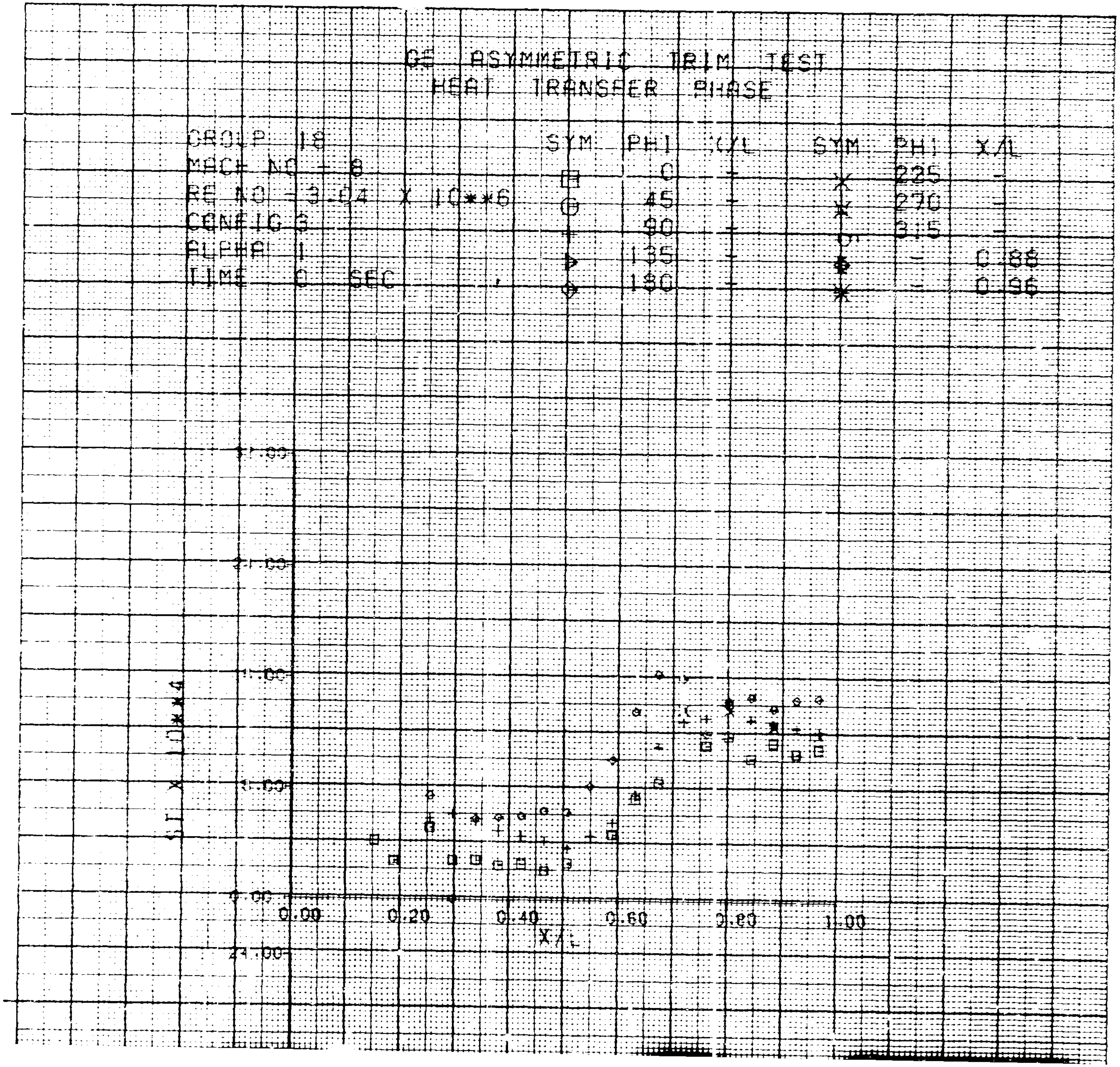
3

```
                                   7/16/69

                      AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
                       VON KARMAN GAS DYNAMICS FACILITY
                        50 INCH HYPERSONIC TUNNEL B
                                 VT0967 000
GROUP  CONFIG   ALPHA-M     BETA-M      ALPHA-C    ROLL   ALP-P   DATE     MACH NO      PO          TO         TIME
  18      3        1.09        0          1.09       0       0     716       8.00      679.07     1300.93       .00
  T-INF      P-INF       Q-INF       V-INF       RHO-INF      MU-INF      RE/FT       RE/D         HO
9.4922E 01 6.8819E-02 3.0849E 00 3.8191E 03 4.0844E-05 7.6422E-08 3.8467E 06 2.7801E 06 3.2883E 02

TC NO   X/L    PHI    TEMP     SLOPE       Q-STOW        HT          HM          HH          ST

  1   .1900     0    479.97  3.8232E 00  8.9719E-01  7.0701E-04  3.1889E-03  1.1421E 02  6.2945E-04
  2   .1667     0    466.14  1.9899E 00  4.3792E-01  5.1793E-04  2.0928E-03  1.1199E 02  2.7991E-04
  3   .2524     0    467.94  2.7477E 00  6.1225E-01  9.6460E-04  3.8977E-03  1.1242E 02  5.2131E-04
  4   .2943     0    478.05  1.9940E 00  4.4026E-01  5.2972E-04  2.1390E-03  1.1499E 02  2.8689E-04
  5   .3363     0    483.02  1.4093E 00  4.4480E-01  5.3791E-04  2.1718E-03  1.1598E 02  2.9045E-04
  6   .3783     0    487.07  1.2801E 00  3.8720E-01  4.7055E-04  1.8992E-03  1.1694E 02  2.5402E-04
  7   .4203     0    490.28  1.3890E 00  3.9882E-01  4.8568E-04  1.9544E-03  1.1770E 02  2.6210E-04
  8   .4623     0    495.04  1.1772E 00  3.2430E-01  3.9805E-04  1.6059E-03  1.1803E 02  2.1479E-04
  9   .5043     0    498.15  1.5161E 00  4.1017E-01  5.0527E-04  2.0381E-03  1.1956E 02  2.7260E-04
 10   .5463     0    531.48  8.1447E-02  2.2852E-02  2.9357E-05  1.1820E-04  1.2748E 02  1.5809E-05
 11   .5882     0    505.24  2.5967E 00  7.1548E-01  8.8918E-04  3.5853E-03  1.2125E 02  4.7953E-04
 12   .6302     0    509.21  4.0460E 00  1.0940E 00  1.3673E-03  5.5120E-03  1.2210E 02  7.3723E-04
 13   .6722     0    518.07  5.9981E 00  1.2521E 00  1.5825E-03  6.3761E-03  1.2443E 02  8.5280E-04
 99   .8822   315.0  530.13  5.0573E 00  1.3174E 00  1.6895E-03  6.8070E-03  1.2715E 02  9.0990E-04
 15   .7583     0    520.91  6.8420E 00  1.4454E 00  2.0853E-03  8.4012E-03  1.2496E 02  1.1237E-03
 16   .7996     0    521.60  6.2100E 00  1.7443E 00  2.2129E-03  8.9149E-03  1.2515E 02  1.1924E-03
 17   .8409     0    522.19  5.9139E 00  1.5111E 00  1.9181E-03  7.7271E-03  1.2526E 02  1.0335E-03
 18   .8822     0    525.92  6.6520E 00  1.6667E 00  2.1258E-03  8.5621E-03  1.2615E 02  1.1452E-03
 19   .9235     0    527.09  6.1981E 00  1.5527E 00  1.9835E-03  7.9883E-03  1.2643E 02  1.0686E-03
 20   .9648     0    531.37  6.6117E 00  1.5900E 00  2.0422E-03  8.2270E-03  1.2745E 02  1.0998E-03
 21   .2524    45.0  462.42  2.4934E 00  7.3708E-01  8.0970E-04  3.5140E-03  1.1111E 02  4.7013E-04
 22   .2943    45.0  471.68  2.7110E 00  7.0988E-01  8.4591E-04  3.4171E-03  1.1330E 02  4.5704E-04
 23   .3363    45.0  476.18  2.7200E 00  6.4735E-01  8.0041E-04  3.2325E-03  1.1436E 02  4.3235E-04
 24   .3783    45.0  480.81  2.1245E 00  6.3863E-01  7.7028E-04  3.1180E-03  1.1546E 02  4.1596E-04
 25   .4203    45.0  486.86  1.8899E 00  5.4912E-01  6.6553E-04  2.6865E-03  1.1641E 02  3.5932E-04
 26   .4623    45.0  491.18  1.9021E 00  5.5614E-01  6.7918E-04  2.7497E-03  1.1709E 02  3.6657E-04
 27   .5043    45.0  495.38  1.9945E 00  5.2965E-01  6.5022E-04  2.6232E-03  1.1890E 02  3.5085E-04
100   .9648   315.0  536.94  6.8794E 00  1.6545E 00  2.1404E-03  8.6155E-03  1.2877E 02  1.1523E-03
 29   .5882    45.0  501.31  1.9296E 00  5.3166E-01  6.5749E-04  2.6517E-03  1.2031E 02  3.5466E-04
 30   .6302    45.0  505.04  2.2157E 00  5.9942E-01  7.4473E-04  3.0029E-03  1.2111E 02  4.0164E-04
 31   .6722    45.0  517.04  2.9382E 00  7.2820E-01  9.0868E-04  3.6865E-03  1.2446E 02  4.8959E-04
 32   .7170    45.0  521.79  4.4563E 00  1.0494E 00  1.3315E-03  5.3641E-03  1.2517E 02  7.1746E-04
 33   .7583    45.0  517.42  5.1567E 00  1.4759E 00  1.8628E-03  7.5082E-03  1.2418E 02  1.0039E-03
 34   .7996    45.0  519.78  6.2940E 00  1.7660E 00  2.2358E-03  9.0047E-03  1.2469E 02  1.2044E-03
 35   .8409    45.0  523.31  6.9073E 00  1.8687E 00  2.3756E-03  9.5695E-03  1.2553E 02  1.2799E-03
 36   .8822    45.0  525.72  6.4934E 00  1.8132E 00  2.3122E-03  9.3120E-03  1.2610E 02  1.2456E-03
 37   .9235    45.0  527.77  6.4496E 00  1.7561E 00  2.2376E-03  9.0112E-03  1.2659E 02  1.2052E-03
 38   .9648    45.0  532.72  6.4984E 00  1.5869E 00  2.0410E-03  8.2207E-03  1.2777E 02  1.0995E-03
 39   .2524    90.0  463.47  3.0780E 00  9.0989E-01  1.0791E-03  4.3449E-03  1.1140E 02  5.8113E-04
 40   .2943    90.0  471.16  2.9871E 00  9.5773E-01  1.1418E-03  4.6120E-03  1.1318E 02  6.1694E-04
 41   .3363    90.0  476.01  2.7637E 00  8.7231E-01  1.0460E-03  4.2245E-03  1.1432E 02  5.6503E-04
 42   .3783    90.0  479.66  2.6614E 00  7.7690E-01  9.3572E-04  3.7783E-03  1.1518E 02  5.0534E-04
 43   .4203    90.0  484.87  2.4017E 00  7.0997E-01  8.5967E-04  3.4704E-03  1.1623E 02  4.6416E-04
 44   .4623    90.0  488.40  2.0874E 00  6.4842E-01  7.8929E-04  3.1855E-03  1.1725E 02  4.2606E-04
 45   .5043    90.0  493.36  2.0492E 00  5.6461E-01  6.9144E-04  2.7898E-03  1.1843E 02  3.7316E-04
 46   .5463    90.0  496.93  2.4749E 00  7.0677E-01  8.6934E-04  3.5069E-03  1.1927E 02  4.6905E-04
 47   .5882    90.0  500.88  3.0045E 00  8.4301E-01  1.0420E-03  4.2025E-03  1.2021E 02  5.6208E-04
 48   .6302    90.0  504.67  4.1138E 00  1.1335E 00  1.4076E-03  5.6758E-03  1.2111E 02  7.5913E-04
 49   .6722    90.0  517.81  6.5623E 00  1.6390E 00  2.0686E-03  8.3354E-03  1.2418E 02  1.1149E-03
 50   .7170    90.0  523.54  8.0074E 00  1.8857E 00  2.3979E-03  9.6599E-03  1.2559E 02  1.2919E-03
 51   .7583    90.0  516.51  7.4689E 00  1.9456E 00  2.4522E-03  9.8817E-03  1.2392E 02  1.3217E-03
 52   .7996    90.0  518.66  8.0008E 00  2.0842E 00  2.6340E-03  1.0613E-02  1.2443E 02  1.4195E-03
 53   .8409    90.0  520.80  7.6828E 00  1.9247E 00  2.4390E-03  9.8242E-03  1.2493E 02  1.3142E-03
 54   .8822    90.0  523.59  7.4289E 00  1.8727E 00  2.3814E-03  9.5925E-03  1.2559E 02  1.2830E-03
 55   .9235    90.0  524.98  7.4937E 00  1.8261E 00  2.3264E-03  9.3704E-03  1.2592E 02  1.2533E-03
 56   .9648    90.0  528.71  7.3596E 00  1.7698E 00  2.2655E-03  9.1232E-03  1.2681E 02  1.2202E-03
 57   .2524   135.0  459.67  1.0139E 00  2.9972E-01  3.5251E-04  1.4249E-03  1.1046E 02  1.9058E-04
 58   .2943   135.0  468.94  3.5369E 00  1.1340E 00  1.3484E-03  5.4470E-03  1.1265E 02  7.2864E-04
 59   .3363   135.0  473.08  3.1911E 00  1.0072E 00  1.2036E-03  4.8615E-03  1.1363E 02  6.5023E-04
 60   .3783   135.0  478.11  2.8424E 00  8.8296E-01  1.0615E-03  4.2864E-03  1.1482E 02  5.7331E-04
 61   .4203   135.0  482.75  2.9543E 00  8.8806E-01  1.0736E-03  4.3343E-03  1.1592E 02  5.7970E-04
 62   .4623   135.0  487.84  2.8278E 00  8.2166E-01  9.9950E-04  4.0340E-03  1.1713E 02  5.3955E-04
 63   .5043   135.0  492.73  3.7223E 00  8.2333E-01  1.0075E-03  4.0642E-03  1.1828E 02  5.4372E-04
 64   .5463   135.0  496.27  3.7797E 00  1.0037E 00  1.2336E-03  4.9763E-03  1.1912E 02  6.6550E-04
 65   .5882   135.0  500.53  5.0772E 00  1.3462E 00  1.6657E-03  6.7183E-03  1.2013E 02  8.9857E-04
 66   .6302   135.0  504.40  7.1142E 00  1.8892E 00  2.3453E-03  9.4570E-03  1.2104E 02  1.2649E-03
 67   .6722   135.0  518.61  9.1971E 00  2.2598E 00  2.8558E-03  1.1507E-02  1.2442E 02  1.5390E-03
 68   .7170   135.0  522.15  9.2476E 00  2.1777E 00  2.7644E-03  1.1136E-02  1.2526E 02  1.4895E-03
 69   .7583   135.0  512.35  5.8961E 00  1.6538E 00  2.0735E-03  8.3575E-03  1.2293E 02  1.1178E-03
 70   .7996   135.0  517.44  7.8536E 00  2.2820E 00  2.8795E-03  1.1603E-02  1.2414E 02  1.5519E-03
 71   .8409   135.0  519.77  7.2230E 00  2.1009E 00  2.6589E-03  1.0713E-02  1.2469E 02  1.4328E-03
 72   .8822   135.0  521.97  7.4037E 00  2.0463E 00  2.5970E-03  1.0462E-02  1.2521E 02  1.3993E-03
 73   .9235   135.0  524.45  7.7536E 00  1.9033E 00  2.4230E-03  9.7600E-03  1.2580E 02  1.3054E-03
 74   .9648   135.0  529.31  8.1458E 00  1.9584E 00  2.5094E-03  1.0105E-02  1.2696E 02  1.3516E-03
 75   .2524   180.0  464.41  4.0362E 00  1.1720E 00  1.3070E-03  5.6853E-03  1.1158E 02  7.4970E-04
 76   .2943   180.0 -110.74  6.1927E-08  1.9055E-08  1.3917E-11  5.4042E-11 -2.1036E 01  7.7684E-12
 77   .3363   180.0  482.39  3.0252E 00  8.9427E-01  1.0806E-03  4.3628E-03  1.1583E 02  5.8352E-04
 78   .3783   180.0  489.63  3.0159E 00  9.0657E-01  1.1038E-03  4.4569E-03  1.1731E 02  5.9526E-04
 79   .4203   180.0  494.61  3.0873E 00  9.1262E-01  1.1193E-03  4.5160E-03  1.1872E 02  6.0401E-04
 80   .4623   180.0  499.46  3.3911E 00  9.6839E-01  1.1968E-03  4.8104E-03  1.1987E 02  6.4459E-04
 81   .5043   180.0  503.02  3.7900E 00  9.4947E-01  1.1778E-03  4.7447E-03  1.2091E 02  6.3526E-04
 82   .5463   180.0  507.79  4.4113E 00  1.2245E 00  1.5298E-03  6.1543E-03  1.2184E 02  8.2314E-04
 83   .5882   180.0  511.04  5.6839E 00  1.5094E 00  1.8894E-03  7.6159E-03  1.2262E 02  1.0186E-03
 84   .6302   180.0  516.78  7.5740E 00  2.0113E 00  2.5358E-03  1.0218E-02  1.2398E 02  1.3667E-03
 85   .6722   180.0  528.44  9.8871E 00  2.3777E 00  3.0425E-03  1.2252E-02  1.2675E 02  1.6387E-03
 86   .7170   180.0  532.56  9.8399E 00  2.3172E 00  2.9811E-03  1.2003E-02  1.2775E 02  1.6053E-03
 87   .7583   180.0  524.27  7.1333E 00  1.7635E 00  2.2445E-03  9.0408E-03  1.2375E 02  1.2092E-03
 88   .7996   180.0  528.30  8.0559E 00  2.0906E 00  2.6849E-03  1.0812E-02  1.2472E 02  1.4461E-03
 89   .8409   180.0  530.29  8.3410E 00  2.1314E 00  2.7337E-03  1.1006E-02  1.2740E 02  1.4723E-03
 90   .8822   180.0  532.07  8.7232E 00  2.0102E 00  2.5842E-03  1.0405E-02  1.2761E 02  1.3917E-03
 91   .9235   180.0  533.13  8.4736E 00  2.1046E 00  2.7093E-03  1.0908E-02  1.2787E 02  1.4588E-03
 92   .9648   180.0  538.21  9.1332E 00  2.1047E 00  2.7273E-03  1.0977E-02  1.2908E 02  1.4682E-03
 93   .8822   225.0  533.17  7.6197E 00  1.9469E 00  2.5003E-03  1.0091E-02  1.2787E 02  1.3496E-03
 94   .9648   225.0  538.32  7.8370E 00  1.8846E 00  2.4425E-03  9.8308E-03  1.2919E 02  1.3149E-03
 95   .7170   270.0  535.37  8.8054E 00  1.9852E 00  2.5628E-03  1.0317E-02  1.2839E 02  1.3790E-03
 96   .7996   270.0  533.31  7.8079E 00  1.9937E 00  2.5672E-03  1.0310E-02  1.2791E 02  1.3824E-03
 97   .8822   270.0  534.54  7.1282E 00  1.8213E 00  2.3490E-03  9.4546E-03  1.2821E 02  1.2640E-03
 98   .9648   270.0  538.59  7.1084E 00  1.7234E 00  2.2346E-03  8.9967E-03  1.2916E 02  1.2030E-03
```

GE ASYMMETRIC TRIP TEST

HEAT TRANSFER PHASE

GROUP 18 SYM PHI X/L SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 18
MACH NO = 8
RE NO = 3.04 X 10**6
CONFIG 3
ALPHA 1
TIME 0 SEC
SYM PHI Y/L
□ 0 -
⊖ 45 -
+ 90 -
▷ 135 -
◇ 180 -
SYM PHI X/L
X 225 -
✱ 270 -
◇ 315 -
◆ - 0.88
✱ - 0.96
4.00
3.00
2.00
1.00
0.00
-1.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

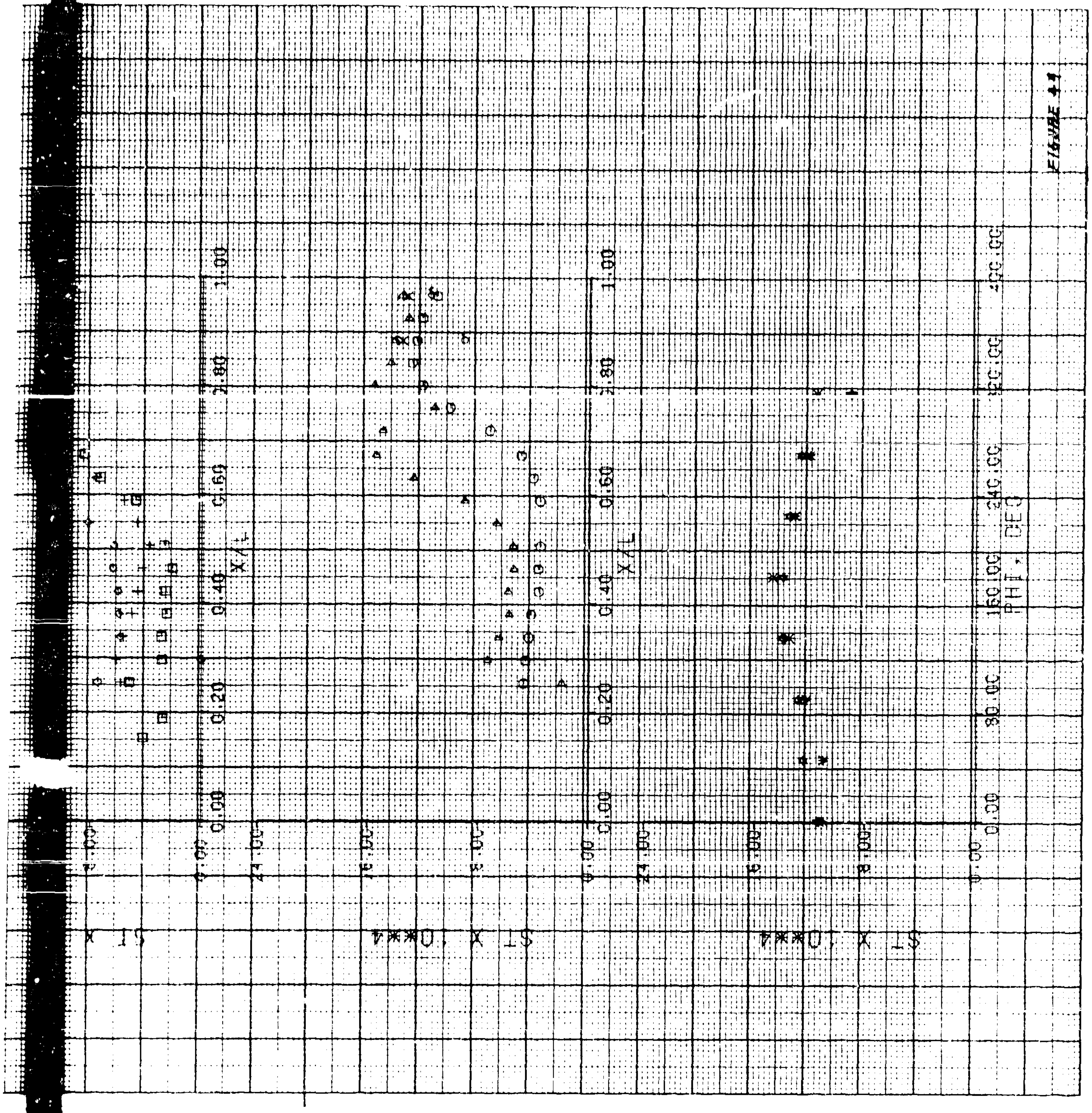


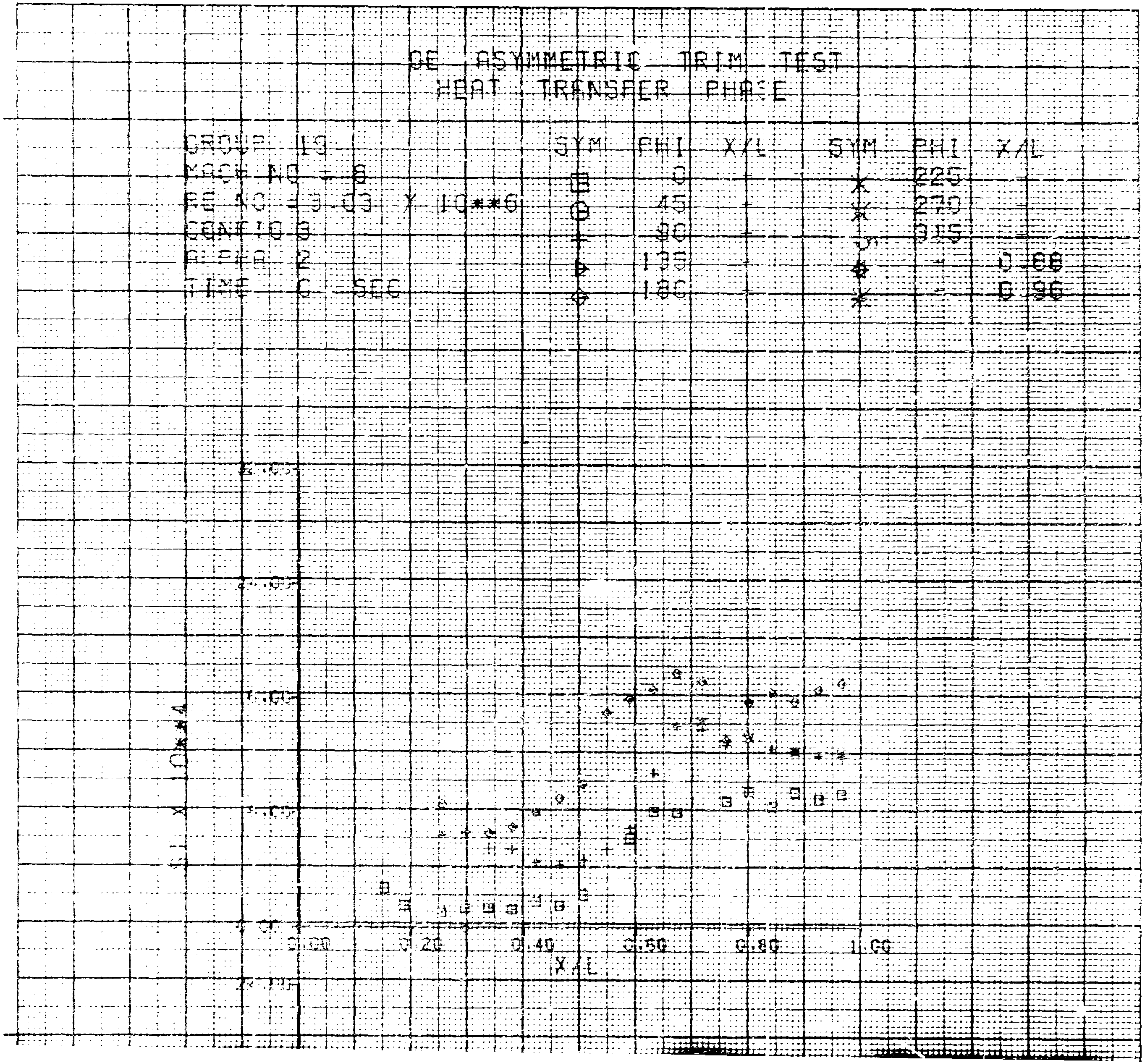
FIGURE 44
ST X
ST X, 0**4
ST X, 0**4
X/L
X/L
PHI, DEG
0.00
0.20
0.40
0.60
0.80
1.00
0.00
80.00
160.00
240.00
320.00
400.00
0.00
8.00
16.00
24.00

Figure 44

3

```
                                        7/16/69

                          AEDC-ARO, INC., ARNOLD AFS, TENNESSEE
                          VON KARMAN GAS DYNAMICS FACILITY
                            50 INCH HYPERSONIC TUNNEL B
                                    VT0957-000
GROUP   CONFIG     ALPHA-M      BETA-M       ALPHA-S     ROLL    ALP-P   DATE     MACH NO      PO          TO          TIME
 15        3         7.84          0           7.66        0        0     716       8.08      373.47      1311.18        0.88
    T-INF        P-INF         Q-INF         V-INF        RHO-INF       MU-INF        RE/FT        RE/D          HO
9.4620E 01   6.8716E-02   3.0745E 00   3.8211E 03   6.0674E-05   7.0501E-09   3.0306E 06   3.779E 06   3.2110E 02

TC NO   X/L     PHI     TEMP     SLOPE        Q-DOT        HT           HM           HW          ST

   1   .1960     0    453.06  1.4040E 00  4.2882E-01  4.9900E-04  2.0177E-03  1.0905E 02  2.7092E-04
   2   .1047     0    442.40  1.0967E 00  2.3954E-01  2.1225E-04  1.1400E-03  1.1110E 02  1.5291E-04
   3   .2524     0    472.14  9.2064E-01  1.5391E-01  1.8343E-04  7.4049E-04  1.1302E 02  9.9322E-05
   4   .2743     0    480.90  6.4009E-01  2.0393E-01  2.4558E-04  9.9168E-04  1.1544E 02  1.3291E-04
   5   .3363     0    486.93  6.9330E-01  1.9989E-01  2.4240E-04  9.7843E-04  1.1491E 02  1.3119E-04
   6   .3703     0    491.17  4.2917E-01  1.8793E-01  2.2913E-04  9.2440E-04  1.1790E 02  1.2394E-04
   7   .4203     0    493.96  9.4999E-01  2.7603E-01  3.3773E-04  1.3625E-03  1.1857E 02  1.8264E-04
   8   .4623     0    497.30  4.3101E-01  2.2919E-01  2.8168E-04  1.1309E-03  1.1936E 02  1.5227E-04
   9   .5043     0    490.69  1.2573E 00  3.4915E-01  4.1912E-04  1.6903E-03  1.1993E 02  2.2660E-04
  10   .5463     0    531.80  7.9126E-02  2.0237E-02  2.5962E-05  1.0453E-04  1.2759E 02  1.4013E-05
  11   .5882     0    506.40  3.1866E 00  9.3295E-01  1.1591E-03  4.6732E-03  1.2152E 02  6.2447E-04
  12   .6302     0    509.79  4.4630E 00  1.2074E 00  1.5044E-03  6.0723E-03  1.2232E 03  8.1994E-04
  13   .6722     0    516.95  4.7383E 00  1.1850E 00  1.4913E-03  6.0040E-03  1.2395E 02  8.0556E-04
  99   .6822   315.0  533.21  4.4096E 00  1.1467E 00  1.4763E-03  5.9934E-03  1.2780E 02  7.9676E-04
  15   .7583     0    519.24  5.1929E 00  1.2969E 00  1.6374E-03  6.5967E-03  1.2456E 02  8.8434E-04
  16   .7996     0    521.04  4.9449E 00  1.3074E 00  1.7597E-03  7.0727E-03  1.2499E 02  9.4816E-04
  17   .8409     0    521.37  4.9523E 00  1.2394E 00  1.5804E-03  6.3227E-03  1.2507E 02  8.4761E-04
  18   .8822     0    524.67  5.9053E 00  1.3792E 00  1.7529E-03  7.0640E-03  1.2581E 02  9.4665E-04
  19   .9235     0    525.97  5.7808E 00  1.3842E 00  1.6597E-03  6.8843E-03  1.2605E 02  8.7649E-04
  20   .9640     0    530.27  5.4196E 00  1.3514E 00  1.7363E-03  6.9649E-03  1.2719E 02  9.3397E-04
  21   .2524   45.0   459.94  2.7557E 00  8.1462E-01  9.5686E-04  3.8675E-03  1.1053E 02  5.1847E-04
  22   .2743   45.0   [illegible]
  23   .3363   45.0   470.90  2.4153E 00  7.2603E-01  8.6392E-04  3.4800E-03  1.1311E 02  4.6763E-04
  24   .3703   45.0   476.79  2.1947E 00  6.5972E-01  7.9055E-04  3.1924E-03  1.1450E 02  4.2796E-04
  25   .4203   45.0   481.31  1.9195E 00  5.5772E-01  6.7198E-04  2.7129E-03  1.1550E 02  3.6368E-04
  26   .4623   45.0   487.57  2.0402E 00  5.6344E-01  6.8605E-04  2.7607E-03  1.1706E 02  3.7009E-04
  27   .5043   45.0   491.77  1.9901E 00  5.0193E-01  6.1245E-04  2.4711E-03  1.1805E 02  3.3120E-04
 100   .9648  315.0   538.70  6.9064E 00  1.4444E 00  1.8094E-03  7.5242E-03  1.2919E 02  1.0087E-03
  29   .5882   45.0   498.49  2.1255E 00  5.8565E-01  7.2054E-04  2.9048E-03  1.1964E 02  3.8960E-04
  30   .6302   45.0   502.12  2.8703E 00  7.7652E-01  9.5966E-04  3.8690E-03  1.2050E 02  5.1879E-04
  31   .6722   45.0   513.30  6.4101E 00  1.1310E 00  1.4181E-03  5.7152E-03  1.2315E 02  7.6617E-04
  32   .7170   45.0   519.10  6.5036E 00  1.5320E 00  1.9341E-03  7.7921E-03  1.2459E 02  1.0446E-03
  33   .7583   45.0   514.74  6.4369E 00  1.7736E 00  2.2260E-03  8.9726E-03  1.2350E 02  1.2029E-03
  34   .7996   45.0   516.84  6.4218E 00  1.8010E 00  2.2680E-03  9.1386E-03  1.2399E 02  1.2251E-03
  35   .8409   45.0   519.67  6.3458E 00  1.7168E 00  2.1687E-03  8.7371E-03  1.2467E 02  1.1713E-03
  36   .8822   45.0   521.73  6.0810E 00  1.5997E 00  2.0261E-03  8.1615E-03  1.2516E 02  1.0941E-03
  37   .9235   45.0   522.64  6.0335E 00  1.5416E 00  1.9569E-03  7.8743E-03  1.2530E 02  1.0556E-03
  38   .9648   45.0   529.44  5.8392E 00  1.4042E 00  1.7960E-03  7.2319E-03  1.2659E 02  9.6949E-04
  39   .2524   90.0   456.47  3.4751E 00  1.0273E 00  1.2016E-03  4.8502E-03  1.0971E 02  6.5129E-04
  40   .2943   90.0   460.89  3.2759E 00  1.0503E 00  1.2339E-03  4.9874E-03  1.1056E 02  6.6800E-04
  41   .3363   90.0   466.94  2.7412E 00  8.4522E-01  1.0247E-03  4.1492E-03  1.1210E 02  5.5503E-04
  42   .3703   90.0   472.46  2.6947E 00  8.5114E-01  1.0347E-03  4.0984E-03  1.1348E 02  5.4943E-04
  43   .4203   90.0   478.74  2.4221E 00  7.1601E-01  8.6803E-04  3.4725E-03  1.1497E 02  4.6552E-04
  44   .4623   90.0   483.87  2.1977E 00  6.0270E-01  8.2426E-04  3.3274E-03  1.1578E 02  [illegible]
  45   .5043   90.0   488.92  2.6361E 00  7.2633E-01  8.8323E-04  3.5642E-03  1.1738E 02  4.7782E-04
  46   .5463   90.0   492.93  2.9345E 00  8.3800E-01  1.0235E-03  4.1295E-03  1.1823E 02  5.5359E-04
  47   .5882   90.0   497.68  3.7639E 00  1.0561E 00  1.2980E-03  5.2396E-03  1.1945E 02  7.0183E-04
  48   .6302   90.0   501.70  5.9107E 00  1.6204E 00  2.0116E-03  8.1122E-03  1.2040E 02  1.0875E-03
  49   .6722   90.0   512.81  7.1085E 00  2.0945E 00  2.6231E-03  1.0572E-02  1.2304E 02  1.4172E-03
  50   .7170   90.0   519.51  8.4113E 00  2.0279E 00  2.5613E-03  1.0319E-02  1.2463E 02  1.3833E-03
  51   .7583   90.0   511.23  7.1272E 00  1.9087E 00  2.3858E-03  9.6159E-03  1.2266E 02  1.2891E-03
  52   .7996   90.0   514.27  7.4500E 00  1.9930E 00  2.5006E-03  1.0077E-02  1.2330E 02  1.3509E-03
  53   .8409   90.0   515.81  7.4176E 00  1.8583E 00  2.3360E-03  9.4132E-03  1.2375E 02  1.2619E-03
  54   .8822   90.0   518.47  7.4650E 00  1.8327E 00  2.3110E-03  9.3134E-03  1.2438E 02  1.2485E-03
  55   .9235   90.0   519.88  7.1772E 00  1.7743E 00  2.2489E-03  9.0279E-03  1.2465E 02  1.2103E-03
  56   .9640   90.0   525.84  7.1726E 00  1.7249E 00  2.1960E-03  8.8463E-03  1.2613E 02  1.1856E-03
  57   .2524  135.0   450.62  1.1740E 00  3.4786E-01  4.0324E-04  1.6307E-03  1.0833E 02  2.1861E-04
  58   .2943  135.0   458.73  4.0110E 00  1.2960E 00  1.5184E-03  6.0972E-03  1.1024E 02  8.1730E-04
  59   .3363  135.0   466.18  3.9210E 00  1.1113E 00  1.3150E-03  5.3113E-03  1.1200E 02  7.1230E-04
  60   .3703  135.0   472.67  3.2305E 00  1.0060E 00  1.1996E-03  4.8443E-03  1.1353E 02  6.4956E-04
  61   .4203  135.0   478.57  3.1276E 00  1.3003E 00  1.2812E-03  5.0582E-03  1.1493E 02  6.5821E-04
  62   .4623  135.0   484.29  3.4490E 00  1.0021E 00  1.2118E-03  4.8913E-03  1.1628E 02  6.5572E-04
  63   .5043  135.0   489.65  4.4051E 00  1.1256E 00  1.3699E-03  5.5280E-03  1.1755E 02  7.4107E-04
  64   .5463  135.0   494.12  6.0570E 00  1.6007E 00  1.9606E-03  7.9419E-03  1.1861E 02  1.0647E-03
  65   .5882  135.0   500.33  8.5098E 00  2.2598E 00  2.7866E-03  1.1238E-02  1.2008E 02  1.5066E-03
  66   .6302  135.0   503.48  9.9020E 00  2.6297E 00  3.2556E-03  1.3126E-02  1.2083E 02  1.7597E-03
  67   .6722  135.0   [illegible]
  68   .7170  135.0   519.08  9.7171E 00  2.2843E 00  2.8885E-03  1.1637E-02  1.2453E 02  1.5601E-03
  69   .7583  135.0   509.69  5.4924E 00  1.6533E 00  2.0625E-03  8.3130E-03  1.2230E 02  1.1145E-03
  70   .7996  135.0   510.21  7.7009E 00  2.3827E 00  2.9768E-03  1.2074E-02  [illegible]
  71   .8409  135.0   518.61  9.1300E 00  2.2402E 00  2.8262E-03  1.1387E-02  1.2442E 02  1.5265E-03
  72   .8822  135.0   520.48  9.1888E 00  2.2154E 00  2.8015E-03  1.1286E-02  1.2496E 02  1.5130E-03
  73   .9235  135.0   522.75  8.4293E 00  2.0927E 00  2.6539E-03  1.0690E-02  1.2540E 02  1.4331E-03
  74   .9640  135.0   528.33  9.1154E 00  2.1921E 00  2.7998E-03  1.1274E-02  1.2673E 02  1.5114E-03
  75   .2524  180.0   440.91  4.4907E 00  1.3655E 00  1.6050E-03  6.4902E-03  1.1076E 02  8.7007E-04
  76   .2943  180.0  -116.76 -1.1546E-14 -3.7020E-15 -2.5924E-18 -1.0818E-17 -2.1036E 01 -1.4503E-18
  77   .3363  180.0   475.33  3.4912E 00  1.0291E 00  1.2310E-03  4.9714E-03  1.1410E 02  6.6646E-04
  78   .3703  180.0   481.04  3.6026E 00  1.0830E 00  1.3053E-03  5.2697E-03  1.1565E 02  7.0646E-04
  79   .4203  180.0   488.17  6.3101E 00  1.2445E 00  1.5119E-03  6.1015E-03  1.1719E 02  8.1796E-04
  80   .4623  180.0   493.81  4.9407E 00  1.3824E 00  1.6910E-03  6.8222E-03  1.1853E 02  9.1450E-04
  81   .5043  180.0   499.07  6.4529E 00  1.5139E 00  1.8439E-03  7.4196E-03  1.1970E 02  1.0070E-03
  82   .5463  180.0   504.21  8.6825E 00  2.2525E 00  2.7910E-03  1.1256E-02  1.2180E 02  1.5007E-03
  83   .5882  180.0   508.71  9.9777E 00  2.3860E 00  2.9706E-03  1.1975E-02  1.2207E 02  1.6053E-03
  84   .6302  180.0   513.36  9.1134E 00  2.4733E 00  3.0996E-03  1.2492E-02  1.2316E 02  1.6746E-03
  85   .6722  180.0   524.05  1.0830E 01  2.6044E 00  3.3188E-03  1.3355E-02  1.2585E 02  1.7876E-03
  86   .7170  180.0   529.41  1.0652E 01  2.5045E 00  3.2003E-03  1.2910E-02  1.2696E 02  1.7318E-03
  87   .7583  180.0   520.13  8.4554E 00  1.9372E 00  2.4486E-03  9.8644E-03  1.2470E 02  1.3224E-03
  88   .7996  180.0   525.73  8.9242E 00  2.2987E 00  2.9262E-03  1.1785E-02  1.2611E 02  1.5799E-03
  89   .8409  180.0   528.14  9.9932E 00  2.4001E 00  3.0647E-03  1.2341E-02  1.2660E 02  1.6544E-03
  90   .8822  180.0   530.19  9.9745E 00  2.2985E 00  2.9427E-03  1.1849E-02  1.2717E 02  1.5884E-03
  91   .9235  180.0   531.26  9.4394E 00  2.4153E 00  3.0964E-03  1.2467E-02  1.2742E 02  1.6713E-03
  92   .9640  180.0   537.09  1.0870E 01  2.4607E 00  3.1809E-03  1.2802E-02  1.2895E 02  1.7163E-03
  93   .8822  225.0   532.26  8.2143E 00  2.0980E 00  2.6942E-03  1.0847E-02  1.2766E 02  1.4542E-03
  94   .9648  225.0   530.35  8.4804E 00  2.0894E 00  2.7032E-03  1.0879E-02  1.2911E 02  1.4585E-03
  95   .7170  270.0   535.82  9.2325E 00  2.0815E 00  2.6842E-03  1.0804E-02  1.2851E 02  1.4484E-03
  96   .7996  270.0   535.41  7.2461E 00  1.9242E 00  2.4801E-03  9.9829E-03  1.2841E 02  1.3383E-03
  97   .8822  270.0   536.19  4.4771E 00  1.7827E 00  2.3080E-03  9.2577E-03  1.2859E 02  1.2411E-03
  98   .9640  270.0   534.83  7.2920E 00  1.7538E 00  2.2733E-03  9.1460E-03  1.2940E 02  1.2264E-03
```

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PHI X/L SYM PHI X/L
GROUP 15 RT


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 19
MACH NO = 8
RE NO = 3.03 X 10**6
CONFIG 8
ALPHA 2
TIME 6 SEC
SYM PHI X/L
⊞ 0 -
⊕ 45 -
+ 90 -
▷ 135 -
◇ 180 -
SYM PHI X/L
X 225 -
✳ 270 -
315 -
✱ - 0.88
✳ - 0.96
1.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
X 10**4

2

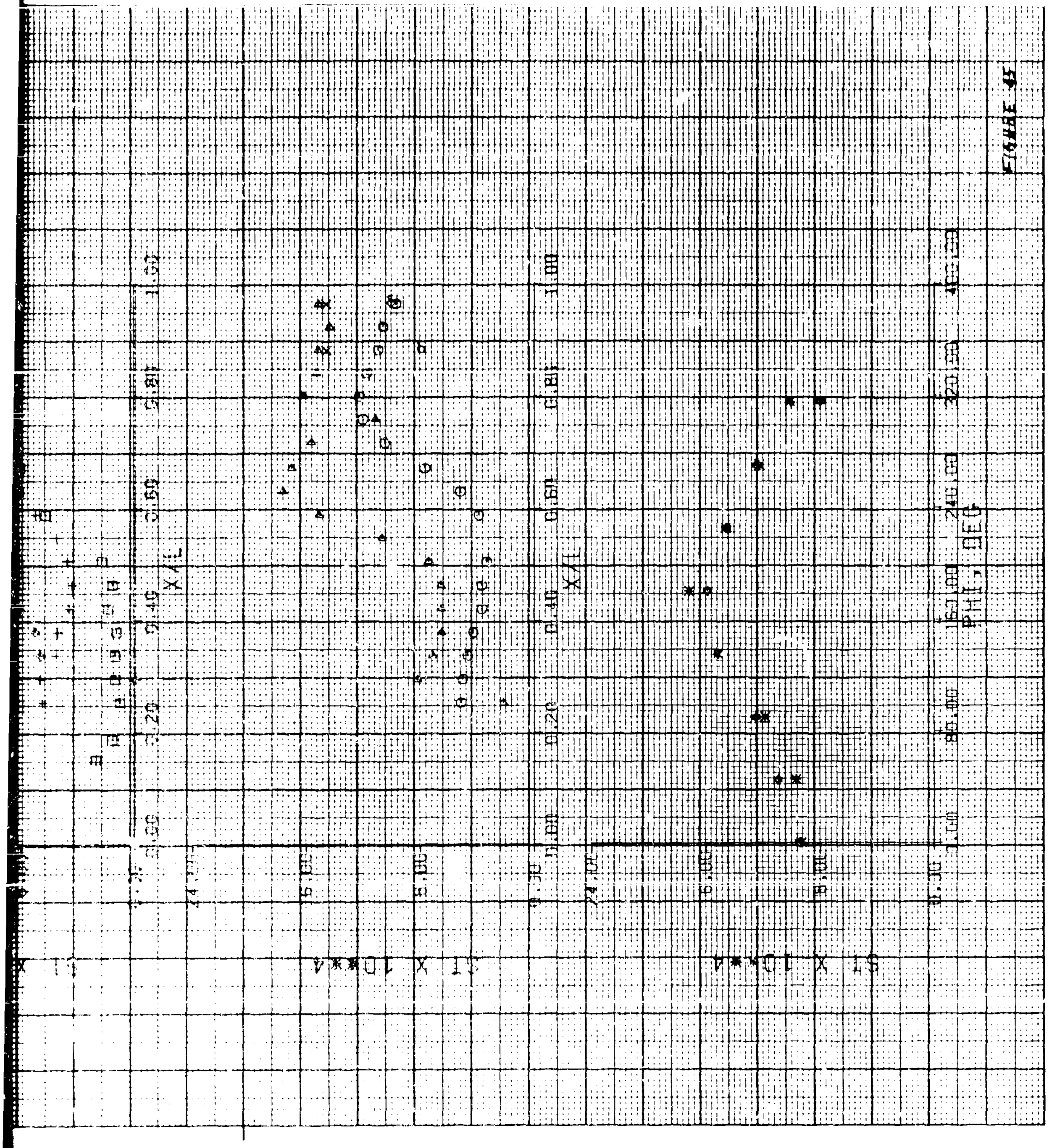


FIGURE 45
X/L
0.00
0.20
0.40
0.60
0.80
1.00
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
ST X 10**4
5.00
24.00

Figure 45

3

```
                                        7/16/69

                           AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                            VON KARMAN GAS DYNAMICS FACILITY
                              50 INCH HYPERSONIC TUNNEL B
                                      VT0967-600
GROUP  CONFIG    ALPHA-M     BETA-M       ALPHA-S     ROLL   ALP-P   DATE      MACH NO        PO           TO            TIME
 20      3         4.02         0           4.02        0      0      714        8.00       667.87       1313.91          .00
   T-INF       P-INF        Q-INF         V-INF        RHO-INF       MU-INF        RE/FT         RE/D          HW
 9.5210E 01  6.8469E-02  3.0047E 00   3.8249E 03   6.0823E-05   7.6654E-08   3.0064E 06   2.7172E 06   3.2100E 02

TC NO    X/L     PHI      TEMP     SLOPE        Q-STOR        HT           HH           HW           ST

   1    .1500      0     503.92   1.0001E 00   2.7095E-01   2.0951E-04   1.1470E-03   1.2093E 02   2.5401E-04
   2    .1867      0     491.15   4.4428E-01   1.9009E-01   2.3117E-04   9.3509E-04   1.1790E 02   1.2004E-04
   3    .2524      0     500.04   2.0160E 00   5.9654E-01   7.3249E-04   2.9557E-03   1.2001E 02   3.9042E-04
   4    .2943      0     517.37   1.5925E 00   5.0263E-01   6.3102E-04   2.5422E-03   1.2412E 02   3.4267E-04
   5    .3363      0     518.41   1.6090E 00   5.0784E-01   6.3840E-04   2.5717E-03   1.2437E 02   3.4666E-04
   6    .3783      0     519.69   1.7623E 00   5.2976E-01   6.6702E-04   2.6864E-03   1.2467E 02   3.6217E-04
   7    .4203      0     519.81   1.5525E 00   4.5110E-01   5.6793E-04   2.2877E-03   1.2465E 02   3.0837E-04
   8    .4623      0     521.59   2.1527E 00   6.4824E-01   8.1811E-04   3.2951E-03   1.2511E 02   4.4417E-04
   9    .5043      0     522.21   2.7707E 00   7.4954E-01   9.4683E-04   3.8134E-03   1.2520E 02   5.1404E-04
  10    .5463      0     530.47   7.9166E-02   2.2212E-02   2.8352E-05   1.1314E-04   1.2723E 02   1.5306E-05
  11    .5882      0     525.21   2.7020E 00   7.4449E-01   9.4397E-04   3.4013E-03   1.2599E 02   5.1240E-04
  12    .6302      0     527.16   2.6321E 00   7.1209E-01   9.0511E-04   3.6444E-03   1.2645E 02   4.9125E-04
  13    .6722      0     526.07   2.4407E 00   6.1144E-01   7.7610E-04   3.1252E-03   1.2619E 02   4.2126E-04
  99    .8822    315.0   541.08   3.1771E 00   8.7972E-01   1.1395E-03   4.5845E-03   1.2995E 02   6.1798E-04
  15    .7583      0     535.37   2.8343E 00   8.0154E-01   8.7546E-04   3.5235E-03   1.2840E 02   4.7495E-04
  16    .7996      0     537.45   2.6917E 00   7.5524E-01   9.7269E-04   3.9143E-03   1.2890E 02   5.2764E-04
  17    .8409      0     537.82   2.8058E 00   7.1692E-01   9.2376E-04   3.7174E-03   1.2898E 02   5.0109E-04
  18    .8822      0     540.79   3.1146E 00   7.8027E-01   1.0092E-03   4.0606E-03   1.2968E 02   5.4735E-04
  19    .9235      0     541.66   3.0790E 00   7.7604E-01   1.0049E-03   4.0432E-03   1.2989E 02   5.4501E-04
  20    .9648      0     539.08   3.4385E 00   8.2609E-01   1.0672E-03   4.2943E-03   1.2928E 02   5.7885E-04
  21    .2524     45.0   491.91   2.3830E 00   6.7504E-01   8.2124E-04   3.3131E-03   1.1809E 02   4.4659E-04
  22    .2943     45.0   507.07   1.8290E 00   5.8640E-01   7.2680E-04   2.9297E-03   1.2168E 02   3.9490E-04
  23    .3363     45.0   508.81   1.7545E 00   5.2762E-01   6.5510E-04   2.6404E-03   1.2209E 02   3.5591E-04
  24    .3783     45.0   509.88   1.7769E 00   5.3416E-01   6.6433E-04   2.6774E-03   1.2234E 02   3.6091E-04
  25    .4203     45.0   511.96   1.5385E 00   4.4702E-01   5.5741E-04   2.2463E-03   1.2284E 02   3.0279E-04
  26    .4623     45.0   515.31   1.8040E 00   5.0618E-01   6.3385E-04   2.5538E-03   1.2364E 02   3.4425E-04
  27    .5043     45.0   517.21   2.5205E 00   6.6931E-01   8.4011E-04   3.3845E-03   1.2408E 02   4.5622E-04
 100    .9648    315.0   544.85   4.5340E 00   1.0903E 00   1.4178E-03   5.7031E-03   1.3066E 02   7.6876E-04
  29    .5882     45.0   521.65   5.0326E 00   1.3866E 00   1.7502E-03   7.0494E-03   1.2514E 02   9.5023E-04
  30    .6302     45.0   524.77   5.7602E 00   1.5608E 00   1.9779E-03   7.9649E-03   1.2588E 02   1.0736E-03
  31    .6722     45.0   528.43   5.9990E 00   1.5462E 00   1.9685E-03   7.9247E-03   1.2675E 02   1.0683E-03
  32    .7170     45.0   531.59   5.4057E 00   1.3672E 00   1.7476E-03   7.0350E-03   1.2750E 02   9.4829E-04
  33    .7583     45.0   533.68   4.9638E 00   1.3401E 00   1.7176E-03   6.9135E-03   1.2800E 02   9.3191E-04
  34    .7996     45.0   535.20   4.6179E 00   1.2957E 00   1.6639E-03   6.6960E-03   1.2836E 02   9.0270E-04
  35    .8409     45.0   537.85   4.5490E 00   1.2307E 00   1.5858E-03   6.3816E-03   1.2899E 02   8.6021E-04
  36    .8822     45.0   539.82   4.4627E 00   1.1738E 00   1.5164E-03   6.1015E-03   1.2946E 02   8.2246E-04
  37    .9235     45.0   541.22   4.4797E 00   1.1466E 00   1.4813E-03   5.9601E-03   1.2979E 02   8.0339E-04
  38    .9648     45.0   540.41   4.9178E 00   1.0864E 00   1.4046E-03   5.6514E-03   1.2960E 02   7.6178E-04
  39    .2524     90.0   485.21   1.3609E 00   9.9351E-01   1.1989E-03   4.8384E-03   1.1650E 02   6.5219E-04
  40    .2943     90.0   498.26   2.9942E 00   9.5949E-01   1.1770E-03   4.7466E-03   1.1959E 02   6.3982E-04
  41    .3363     90.0   500.99   2.8131E 00   8.8791E-01   1.0922E-03   4.4042E-03   1.2023E 02   5.9367E-04
  42    .3783     90.0   503.62   2.5372E 00   8.0040E-01   9.8829E-04   3.9845E-03   1.2086E 02   5.3709E-04
  43    .4203     90.0   506.24   2.5132E 00   7.4292E-01   9.1983E-04   3.7079E-03   1.2148E 02   4.9981E-04
  44    .4623     90.0   508.10   2.1492E 00   6.6764E-01   8.2853E-04   3.3395E-03   1.2192E 02   4.5015E-04
  45    .5043     90.0   511.84   3.0078E 00   8.2874E-01   1.0333E-03   4.1639E-03   1.2281E 02   5.6127E-04
  46    .5463     90.0   516.57   4.3185E 00   1.2332E 00   1.5467E-03   6.2314E-03   1.2393E 02   8.3996E-04
  47    .5882     90.0   518.98   6.3903E 00   1.7930E 00   2.2555E-03   9.0840E-03   1.2450E 02   1.2248E-03
  48    .6302     90.0   522.35   7.6760E 00   2.1150E 00   2.6712E-03   1.0759E-02   1.2526E 02   1.4502E-03
  49    .6722     90.0   527.96   8.3987E 00   2.1040E 00   2.6771E-03   1.0779E-02   1.2664E 02   1.4529E-03
  50    .7170     90.0   531.97   7.4760E 00   1.8078E 00   2.3119E-03   9.3066E-03   1.2759E 02   1.2545E-03
  51    .7583     90.0   530.37   6.6691E 00   1.6852E 00   2.1507E-03   8.6584E-03   1.2721E 02   1.1671E-03
  52    .7996     90.0   532.80   6.6843E 00   1.7413E 00   2.2292E-03   8.9733E-03   1.2779E 02   1.2096E-03
  53    .8409     90.0   534.79   6.4420E 00   1.6389E 00   2.1036E-03   8.4665E-03   1.2826E 02   1.1412E-03
  54    .8822     90.0   537.59   6.6585E 00   1.6345E 00   2.1054E-03   8.4726E-03   1.2893E 02   1.1421E-03
  55    .9235     90.0   538.87   6.7102E 00   1.6137E 00   2.0820E-03   8.3780E-03   1.2923E 02   1.1293E-03
  56    .9648     90.0   537.84   6.5866E 00   1.5839E 00   2.0410E-03   8.2133E-03   1.2899E 02   1.1071E-03
  57    .2524    135.0   476.00   1.2162E 00   3.5952E-01   4.2907E-04   1.7325E-03   1.1432E 02   2.3353E-04
  58    .2943    135.0   486.38   4.3449E 00   1.3931E 00   1.6834E-03   6.7933E-03   1.1678E 02   9.1570E-04
  59    .3363    135.0   489.93   3.8901E 00   1.2278E 00   1.4901E-03   6.0121E-03   1.1761E 02   8.1041E-04
  60    .3783    135.0   493.68   3.7913E 00   1.1777E 00   1.4358E-03   5.7920E-03   1.1850E 02   7.8073E-04
  61    .4203    135.0   496.88   4.0785E 00   1.2260E 00   1.5006E-03   6.0519E-03   1.1926E 02   8.1578E-04
  62    .4623    135.0   501.43   4.6499E 00   1.3511E 00   1.6629E-03   6.7051E-03   1.2034E 02   9.0381E-04
  63    .5043    135.0   507.23   7.5050E 00   1.9176E 00   2.3771E-03   9.5820E-03   1.2171E 02   1.2916E-03
  64    .5463    135.0   512.07   9.9860E 00   2.6518E 00   3.3072E-03   1.3327E-02   1.2286E 02   1.7965E-03
  65    .5882    135.0   516.78   1.0804E 01   2.8691E 00   3.5993E-03   1.4501E-02   1.2398E 02   1.9546E-03
  66    .6302    135.0   518.79   1.0824E 01   2.8742E 00   3.6149E-03   1.4562E-02   1.2446E 02   1.9629E-03
  67    .6722    135.0   527.20   1.0887E 01   2.6100E 00   [illegible]  [illegible]  1.2646E 02   [illegible]
  68    .7170    135.0   529.80   1.0205E 01   2.4032E 00   3.0649E-03   1.2339E-02   1.2707E 02   1.6633E-03
  69    .7583    135.0   524.31   6.5245E 00   1.8306E 00   2.3185E-03   9.3368E-03   1.2577E 02   1.2586E-03
  70    .7996    135.0   530.54   8.8178E 00   2.5621E 00   3.2707E-03   1.3147E-02   1.2726E 02   1.7749E-03
  71    .8409    135.0   532.62   8.6043E 00   2.3707E 00   3.0344E-03   1.2214E-02   1.2775E 02   1.6465E-03
  72    .8822    135.0   534.67   9.9668E 00   2.4259E 00   3.1132E-03   1.2530E-02   1.2823E 02   1.6890E-03
  73    .9235    135.0   536.55   9.4455E 00   2.3186E 00   2.9827E-03   1.2004E-02   1.2868E 02   1.6180E-03
  74    .9648    135.0   539.87   1.0365E 01   2.4925E 00   3.2202E-03   1.2957E-02   1.2947E 02   1.7466E-03
  75    .2524    180.0   477.29   5.5310E 00   1.6071E 00   1.9209E-03   7.7557E-03   1.1462E 02   1.0454E-03
  76    .2943    180.0  -116.76   6.1927E-08   1.9855E-08   1.3878E-11   5.7907E-11  -2.1036E 01   7.8057E-12
  77    .3363    180.0   491.95   4.3888E 00   1.2976E 00   1.5784E-03   6.3676E-03   1.1809E 02   8.5832E-04
  78    .3783    180.0   496.20   5.5979E 00   1.5320E 00   1.8740E-03   7.5585E-03   1.1910E 02   1.0189E-03
  79    .4203    180.0   501.04   6.6427E 00   1.7863E 00   2.1975E-03   8.8609E-03   1.2025E 02   1.1944E-03
  80    .4623    180.0   507.27   8.7366E 00   2.4949E 00   3.0930E-03   1.2467E-02   1.2172E 02   1.6805E-03
  81    .5043    180.0   513.68   1.1387E 01   2.8528E 00   3.5649E-03   1.4365E-02   1.2324E 02   1.9363E-03
  82    .5463    180.0   518.11   1.2775E 01   3.3924E 00   4.2629E-03   1.7173E-02   1.2430E 02   2.3148E-03
  83    .5882    180.0   520.30   1.0932E 01   2.9030E 00   3.6580E-03   1.4734E-02   1.2482E 02   1.9861E-03
  84    .6302    180.0   524.62   1.0584E 01   2.8106E 00   3.5609E-03   1.4340E-02   1.2584E 02   1.9330E-03
  85    .6722    180.0   534.89   1.1943E 01   2.8721E 00   3.6865E-03   1.4837E-02   1.2827E 02   2.0000E-03
  86    .7170    180.0   539.03   1.2017E 01   2.8300E 00   3.6522E-03   1.4696E-02   1.2927E 02   1.9810E-03
  87    .7583    180.0   532.17   9.5107E 00   2.2871E 00   2.9257E-03   1.1777E-02   1.2764E 02   1.5875E-03
  88    .7996    180.0   538.21   1.1307E 01   2.6840E 00   3.4612E-03   1.3928E-02   1.2907E 02   1.8775E-03
  89    .8409    180.0   540.32   1.1004E 01   2.8117E 00   3.6347E-03   1.4625E-02   1.2958E 02   1.9713E-03
  90    .8822    180.0   542.64   1.1454E 01   2.7317E 00   3.5418E-03   1.4249E-02   1.3013E 02   1.9207E-03
  91    .9235    180.0   544.77   1.1870E 01   2.9014E 00   3.7720E-03   1.5173E-02   1.3063E 02   2.0453E-03
  92    .9648    180.0   547.64   1.2884E 01   2.9690E 00   3.8746E-03   1.5584E-02   1.3132E 02   2.1006E-03
  93    .8822    225.0   542.88   9.2639E 00   2.3670E 00   3.0760E-03   1.2351E-02   1.3019E 02   1.6648E-03
  94    .9648    225.0   547.24   9.9434E 00   2.3913E 00   3.1191E-03   1.2545E-02   1.3123E 02   1.6911E-03
  95    .7170    270.0   541.25   8.1594E 00   1.8845E 00   2.4392E-03   9.4138E-03   1.2980E 02   1.3229E-03
  96   [illegible] 270.0   543.06   5.5116E 00   1.7292E 00   2.2455E-03   9.0331E-03   1.3042E 02   1.2176E-03
  97    .8822    270.0   546.00   6.3675E 00   1.6270E 00   2.1187E-03   8.5223E-03   1.3093E 02   1.1488E-03
  98    .9648    270.0   546.77   6.4812E 00   1.6540E 00   2.1571E-03   8.6763E-03   1.3111E 02   1.1695E-03
```

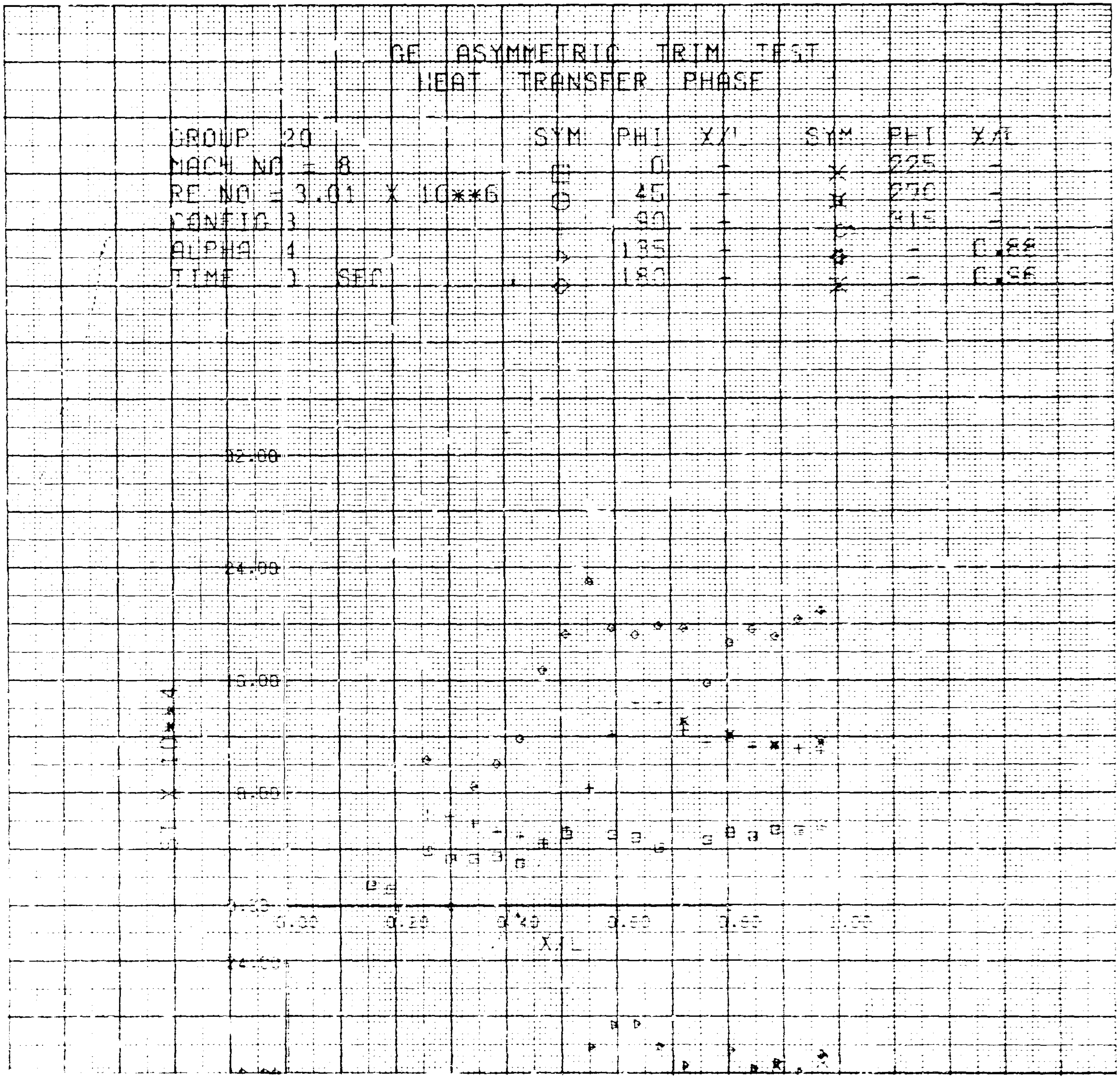
GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE

GROUP 20
MACH NO 8

SYM PHI X/L
□ 0

SYM PHI X/L
✱ 225

GROUP 20 SYM PHI X/L SYM PHI X/L
MACH NO = 8 0 225



2

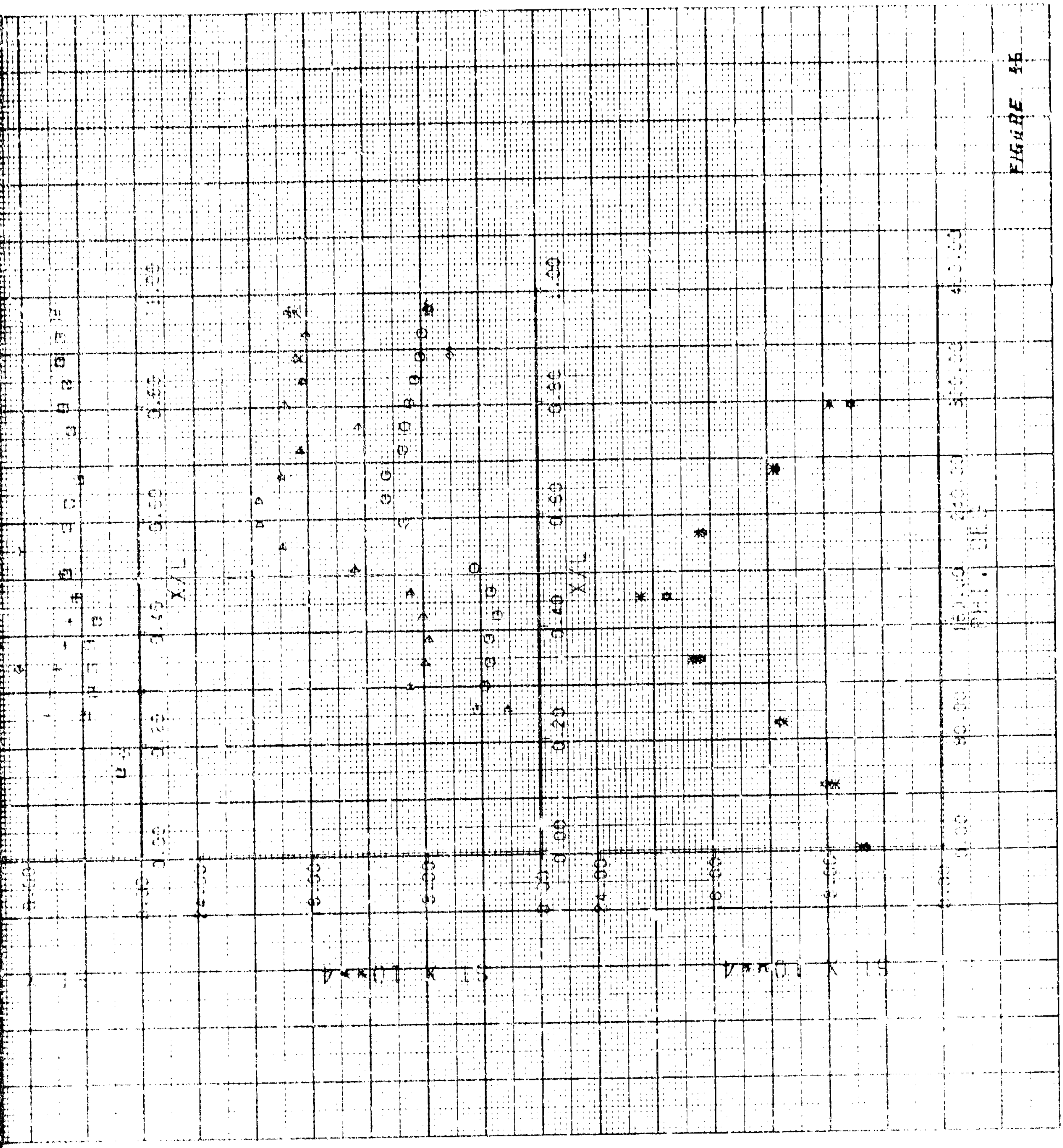


FIGURE 46
X/L
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
0.20
0.40
0.60
0.80
1.00
DELT. DEG

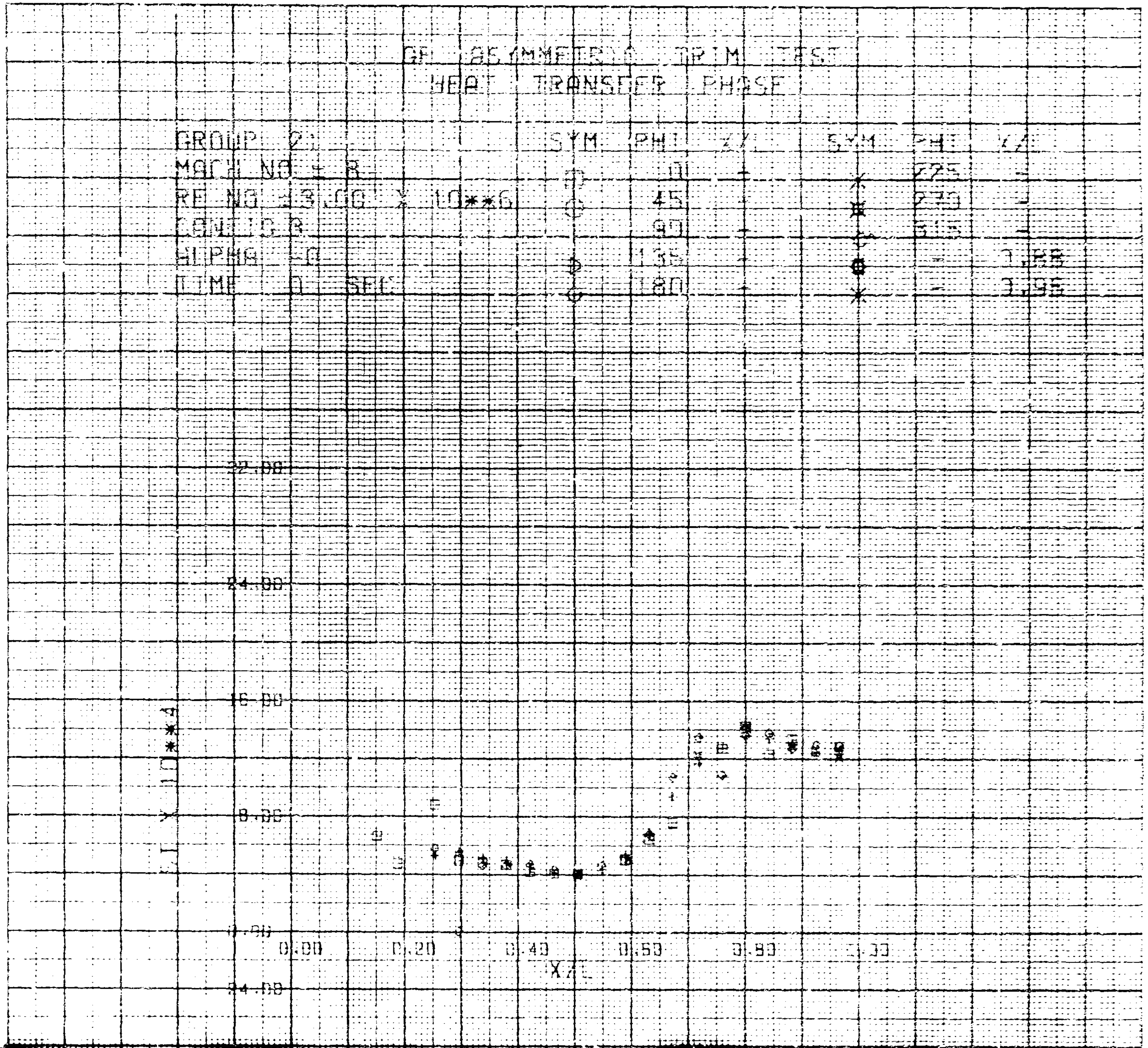
Figure 46

```
                                   7/14/69

                     AEDC-ARO,INC., ARNOLD AFS, TENNESSEE
                      VON KARMAN GAS DYNAMICS FACILITY
                        50 INCH HYPERSONIC TUNNEL B
                                 VTO4- 800
GROUP  CONFIG   ALPHA-M     BETA-M      ALPHA-S    RLL  ALP-P  DATE   MACH NO      PC        TG       TIME
 41      1       -.01         0          -.01        0     0    714     8.00     668.47    1316.11     .00
  T-INF       P-INF       Q-INF       V-INF      RHO-INF      MU-INF      RE/FT       RE/D         HO
9.5370E 01 6.0472E-02 3.6741E 00 3.4291E 03 6.8235E-05 7.6782E-08 3.3031E 06 7.7547E 05 3.1260E 02

TC NO   X/L    PHI    TEMP    SLOPE       Q-STOR       HT          HM          HMI         ST

  1    .1900    0    507.87 4.4309E 00 9.0623E-01 1.2223E-03 4.9259E-03 1.2220E 02 9.0399E-04
  2    .1867    0    498.52 1.7590E 00 7.1573E-01 8.7541E-04 3.5249E-03 1.1965E 02 6.7579E-04
  3    .2524    0    503.74 4.4627E 00 1.3192E 00 1.6239E-03 6.5463E-03 1.2049E 02 8.0236E-04
  4    .2943    0    519.79 2.3010E 00 7.2666E-01 9.1222E-04 3.6741E-03 1.2469E 02 6.9542E-04
  5    .3363    0    522.57 2.2492E 00 7.0993E-01 8.9464E-04 3.6027E-03 1.2536E 02 6.8560E-04
  6    .3783    0    521.50 2.2723E 00 6.8506E-01 8.6187E-04 3.4706E-03 1.2560E 02 6.6779E-04
  7    .4203    0    524.38 2.0973E 00 6.0938E-01 7.8950E-04 3.0945E-03 1.2574E 02 6.1784E-04
  8    .4623    0    526.45 2.1373E 00 5.8890E-01 7.4577E-04 3.0029E-03 1.2628E 02 6.0471E-04
  9    .5043    0    525.97 2.1555E 00 5.8314E-01 7.3602E-04 2.9715E-03 1.2616E 02 6.0052E-04
 10    .5463    0    530.17 -5.4206E-03 -1.6332E-03 -2.0796E-06 -8.3767E-06 1.2773E 02 -1.1207E-06
 11    .5882    0    529.04 2.4476E 00 7.2946E-01 9.2849E-04 3.7313E-03 1.2690E 02 5.0293E-04
 12    .6302    0    531.17 3.4517E 00 9.3302E-01 1.1897E-03 4.7886E-03 1.2740E 02 6.4544E-04
 13    .8722    0    530.29 4.3888E 00 1.0945E 00 1.3928E-03 5.6044E-03 1.2719E 02 7.5567E-04
 99    .8822  315.0  542.35 5.1546E 00 1.3364E 00 1.7018E-03 6.8456E-03 1.3006E 02 9.2272E-04
 15    .7583    0    519.63 7.5788E 00 1.8225E 00 2.3472E-03 9.4435E-03 1.2941E 02 1.2729E-03
 16    .7996    0    541.11 7.2564E 00 2.0360E 00 2.6272E-03 1.0569E-02 1.2977E 02 1.4246E-03
 17    .8409    0    550.10 6.9106E 00 1.7657E 00 2.2773E-03 9.1618E-03 1.2968E 02 1.2349E-03
 18    .8822    0    544.30 7.5043E 00 1.9050E 00 2.4683E-03 9.9280E-03 1.3053E 02 1.3382E-03
 19    .9235    0    545.01 7.1143E 00 1.7823E 00 2.3114E-03 9.2966E-03 1.3070E 02 1.2531E-03
 20    .9648    0    544.42 7.2282E 00 1.8344E 00 2.3772E-03 9.5616E-03 1.3053E 02 1.2888E-03
 21    .2524  45.0   497.37 2.9306E 00 8.6633E-01 1.0581E-03 4.2669E-03 1.1938E 02 5.7513E-04
 22    .2943  45.0   511.38 2.6979E 00 8.0086E-01 9.9523E-04 4.0102E-03 1.2270E 02 5.4053E-04
 23    .3363  45.0   514.20 2.3976E 00 7.2073E-01 8.9878E-04 3.6210E-03 1.2337E 02 4.8807E-04
 24    .3783  45.0   510.05 2.2311E 00 6.7666E-01 8.3825E-04 3.3769E-03 1.2301E 02 4.5516E-04
 25    .4203  45.0   510.94 2.6559E 00 5.9730E-01 7.4747E-04 3.0110E-03 1.2402E 02 4.0585E-04
 26    .4623  45.0   520.94 2.1862E 00 6.1341E-01 7.7057E-04 3.1035E-03 1.2476E 02 4.1332E-04
 27    .5043  45.0   521.34 2.1540E 00 5.7200E-01 7.1972E-04 2.8985E-03 1.2507E 02 3.9068E-04
100    .9648 315.0   548.64 7.0605E 00 1.6975E 00 2.2125E-03 8.8970E-03 1.3157E 02 1.1992E-03
 29    .5882  45.0   523.81 2.4777E 00 7.3779E-01 9.3121E-04 3.7498E-03 1.2565E 02 5.0542E-04
 30    .6302  45.0   526.73 3.5163E 00 9.5130E-01 1.2052E-03 4.8523E-03 1.2636E 02 6.5403E-04
 31    .8722  45.0   530.70 5.3260E 00 1.3074E 00 1.6646E-03 6.7003E-03 1.2729E 02 9.0312E-04
 32    .7170  45.0   534.76 7.2877E 00 1.7162E 00 2.1964E-03 8.8342E-03 1.2825E 02 1.1914E-03
 33    .7583  45.0   536.59 7.2745E 00 2.0093E 00 2.5713E-03 1.0347E-02 1.2869E 02 1.3946E-03
 34    .7996  45.0   537.99 7.2983E 00 2.0472E 00 2.6309E-03 1.0586E-02 1.2902E 02 1.4229E-03
 35    .8409  45.0   540.82 7.0876E 00 1.9175E 00 2.4732E-03 9.9499E-03 1.2970E 02 1.3411E-03
 36    .8822  45.0   542.91 6.4536E 00 1.8027E 00 2.3314E-03 9.3784E-03 1.3020E 02 1.2641E-03
 37    .9235  45.0   544.12 6.8212E 00 1.7429E 00 2.2577E-03 9.0810E-03 1.3048E 02 1.2240E-03
 38    .9648  45.0   544.51 6.4891E 00 1.6086E 00 2.0848E-03 8.3854E-03 1.3055E 02 1.1302E-03
 39    .2524  90.0   496.05 2.6968E 00 7.4720E-01 9.6975E-04 3.9113E-03 1.1859E 02 5.2719E-04
 40    .2943  90.0   50  24 2.5502E 00 8.1765E-01 1.0071E-03 4.0599E-03 1.2101E 02 5.4721E-04
 41    .3363  90.0   506.83 2.3974E 00 7.5608E-01 9.3501E-04 3.7685E-03 1.2162E 02 5.0795E-04
 42    .3783  90.0   508.62 2.2890E 00 7.2249E-01 8.9474E-04 3.6059E-03 1.2204E 02 4.8603E-04
 43    .4203  90.0   510.78 2.2241E 00 6.5748E-01 8.1641E-04 3.2898E-03 1.2256E 02 4.4343E-04
 44    .4623  90.0   512.55 1.9316E 00 5.9097E-01 7.4665E-04 3.0084E-03 1.2298E 02 4.0549E-04
 45    .5043  90.0   515.11 2.2100E 00 6.0892E-01 7.6020E-04 3.0676E-03 1.2358E 02 4.1280E-04
 46    .5463  90.0   516.5  2.2374E 00 6.3803E-01 7.9910E-04 3.2196E-03 1.2392E 02 4.3309E-04
 47    .5882  90.0   519.56 2.7042E 00 7.5974E-01 9.5254E-04 3.8365E-03 1.2464E 02 5.1712E-04
 48    .6302  90.0   522.64 3.6182E 00 9.9693E-01 1.2564E-03 5.0597E-03 1.2537E 02 6.8198E-04
 49    .8722  90.0   527.55 5.4357E 00 1.3619E 00 1.7269E-03 6.9534E-03 1.2654E 02 9.3710E-04
 50    .7170  90.0   533.42 7.1575E 00 1.6855E 00 2.1535E-03 8.6672E-03 1.2794E 02 1.1682E-03
 51    .7583  90.0   532.15 7.0703E 00 1.8418E 00 2.3568E-03 9.4584E-03 1.2768E 02 1.2749E-03
 52    .7996  90.0   534.76 7.4516E 00 2.0453E 00 2.6177E-03 1.0535E-02 1.2825E 02 1.4199E-03
 53    .8409  90.0   536.15 7.7260E 00 1.9355E 00 2.4813E-03 9.9848E-03 1.2856E 02 1.3458E-03
 54    .8822  90.0   538.95 7.5854E 00 1.8620E 00 2.3959E-03 9.6398E-03 1.2925E 02 1.2993E-03
 55    .9235  90.0   540.47 7.4259E 00 1.7858E 00 2.3022E-03 9.2621E-03 1.2960E 02 1.2484E-03
 56    .9648  90.0   540.15 7.3611E 00 1.7702E 00 2.2813E-03 9.1782E-03 1.2954E 02 1.2371E-03
 57    .2524 135.0   484.42 8.1277E-01 2.4026E-01 2.8809E-04 1.1658E-03 1.1631E 02 1.5713E-04
 58    .2943 135.0   491.65 2.7140E 00 8.7015E-01 1.0554E-03 4.2573E-03 1.1802E 02 5.7383E-04
 59    .3363 135.0   494.63 2.4794E 00 7.8257E-01 9.5364E-04 3.8471E-03 1.1873E 02 5.1787E-04
 60    .3783 135.0   497.64 2.1330E 00 7.2472E-01 8.6550E-04 3.5708E-03 1.1945E 02 4.8130E-04
 61    .4203 135.0   500.94 2.2476E 00 6.7561E-01 8.2881E-04 3.3416E-03 1.2022E 02 4.5040E-04
 62    .4623 135.0   504.64 2.1488E 00 6.2437E-01 7.6943E-04 3.1015E-03 1.2110E 02 4.1805E-04
 63    .5043 135.0   508.04 2.2605E 00 5.7757E-01 7.1479E-04 2.8807E-03 1.2192E 02 3.8829E-04
 64    .5463 135.0   510.41 2.4442E 00 6.4906E-01 8.0559E-04 3.2463E-03 1.2247E 02 4.3756E-04
 65    .5882 135.0   513.09 3.0013E 00 7.9701E-01 9.9251E-04 3.9949E-03 1.2310E 02 5.3920E-04
 66    .6302 135.0   516.20 3.9457E 00 1.0478E 00 1.3099E-03 5.2768E-03 1.2384E 02 7.1124E-04
 67    .8722 135.0   524.07 5.7683E 00 1.3872E 00 1.7514E-03 7.0553E-03 1.2571E 02 9.5056E-04
 68    .7170 135.0   528.49 7.3794E 00 1.7650E 00 2.2663E-03 9.1234E-03 1.2676E 02 1.2297E-03
 69    .7583 135.0   524.21 5.1717E 00 1.4517E 00 1.8331E-03 7.3814E-03 1.2575E 02 9.9492E-04
 70    .7996 135.0   529.42 7.4077E 00 2.1524E 00 2.7360E-03 1.1014E-02 1.2698E 02 1.4845E-03
 71    .8409 135.0   530.77 6.9512E 00 1.9193E 00 2.4388E-03 9.8160E-03 1.2731E 02 1.3230E-03
 72    .8822 135.0   533.31 7.6443E 00 1.9058E 00 2.4346E-03 9.7985E-03 1.2791E 02 1.3207E-03
 73    .9235 135.0   535.93 7.1154E 00 1.7466E 00 2.2387E-03 9.0089E-03 1.2853E 02 1.2143E-03
 74    .9648 135.0   538.19 7.4186E 00 1.7821E 00 2.2909E-03 9.2176E-03 1.2907E 02 1.2424E-03
 75    .2524 180.0   485.92 3.0103E 00 8.7465E-01 1.0536E-03 4.2512E-03 1.1667E 02 5.7301E-04
 76    .2943 180.0  -116.74 6.1927E-08 1.9855E-08 1.3857E-11 5.7811E-11 -2.1036E 01 7.7923E-12
 77    .3363 180.0   [illegible] [illegible] [illegible] [illegible] [illegible] 1.1914E 02 [illegible]
 78    .3783 180.0   499.71 2.1175E 00 6.9663E-01 8.5327E-04 3.4405E-03 1.1993E 02 4.6374E-04
 79    .4203 180.0   503.94 2.7799E 00 7.0353E-01 8.6627E-04 3.4920E-03 1.2094E 02 4.7068E-04
 80    .4623 180.0   508.30 2.2647E 00 6.4673E-01 8.0069E-04 3.2265E-03 1.2197E 02 4.3489E-04
 81    .5043 180.0   511.53 2.3904E 00 5.9864E-01 7.4429E-04 2.9991E-03 1.2273E 02 4.0424E-04
 82    .5463 180.0   514.11 2.5660E 00 6.8190E-01 8.4563E-04 3.5211E-03 1.2335E 02 4.6139E-04
 83    .5882 180.0   515.61 2.8387E 00 7.5382E-01 9.4289E-04 3.7963E-03 1.2395E 02 5.1196E-04
 84    .6302 180.0   521.64 3.7564E 00 9.9752E-01 1.2556E-03 5.0546E-03 1.2516E 02 6.8156E-04
 85    .8722 180.0   530.64 6.4537E 00 1.5520E 00 1.9759E-03 7.9535E-03 1.2727E 02 1.0720E-03
 86    .7170 180.0   515.74 8.2404E 00 1.9405E 00 2.4867E-03 1.0007E-02 1.2949E 02 1.3488E-03
 87    .7583 180.0   531.70 6.5515E 00 1.5755E 00 2.0085E-03 8.0844E-03 1.2753E 02 1.0897E-03
 88    .7996 180.0   535.45 7.6295E 00 1.9612E 00 2.5122E-03 1.0110E-02 1.2842E 02 1.3627E-03
 89    .8409 180.0   537.40 7.7270E 00 1.9743E 00 2.5354E-03 1.0202E-02 1.2888E 02 1.3751E-03
 90    .8822 180.0   539.45 7.9215E 00 1.8254E 00 2.3504E-03 9.4563E-03 1.2937E 02 1.2746E-03
 91    .9235 180.0   541.30 7.5650E 00 1.8570E 00 2.3967E-03 9.6417E-03 1.2981E 02 1.2996E-03
 92    .9648 180.0   545.48 8.0077E 00 1.8453E 00 2.3945E-03 9.6309E-03 1.3081E 02 1.2981E-03
 93    .8822 225.0   541.34 7.1343E 00 1.8224E 00 2.3528E-03 9.4652E-03 1.2982E 02 1.2758E-03
 94    .9648 225.0   546.09 7.2535E 00 1.7443E 00 2.2653E-03 9.1107E-03 1.3095E 02 1.2280E-03
 95    .7170 270.0   541.65 7.7517E 00 1.7476E 00 2.2565E-03 9.0779E-03 1.2990E 02 1.2236E-03
 96    .7596 270.0   545.12 7.5732E 00 2.0111E 00 2.6084E-03 1.0491E-02 1.3072E 02 1.4141E-03
 97    .8822 270.0   545.81 7.1839E 00 1.8356E 00 2.3829E-03 9.5840E-03 1.3069E 02 1.2918E-03
 98    .9648 270.0   548.02 7.1233E 00 1.7130E 00 2.2302E-03 8.9687E-03 1.3141E 02 1.2089E-03
```

OF ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

SYM


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 2
MACH NO = 8
RE NO =3.00 X 10**6
CONFIG 8
ALPHA =0
TIME 0 SEC
SYM PHI Z/L
0
45
90
135
180
SYM PHI Z/L
225
270
315
3.88
3.95
32.00
24.00
16.00
8.00
0.00
24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

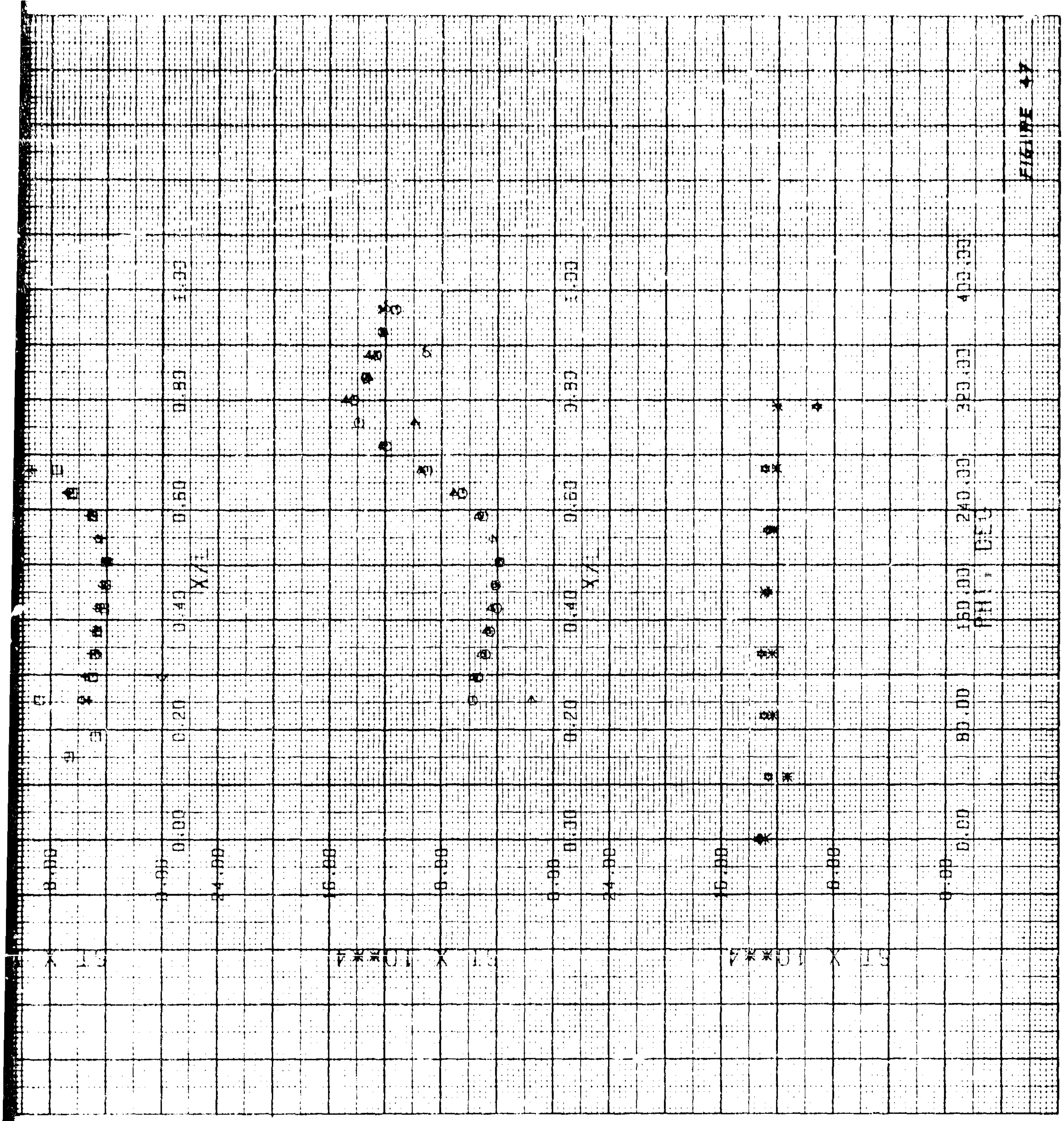


FIGURE 47
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
80.00
160.00
240.00
320.00
400.00
PHI, DEG
8.00
0.00
24.00
16.00
X 10**1

Figure 47

3

7/16/[illegible]

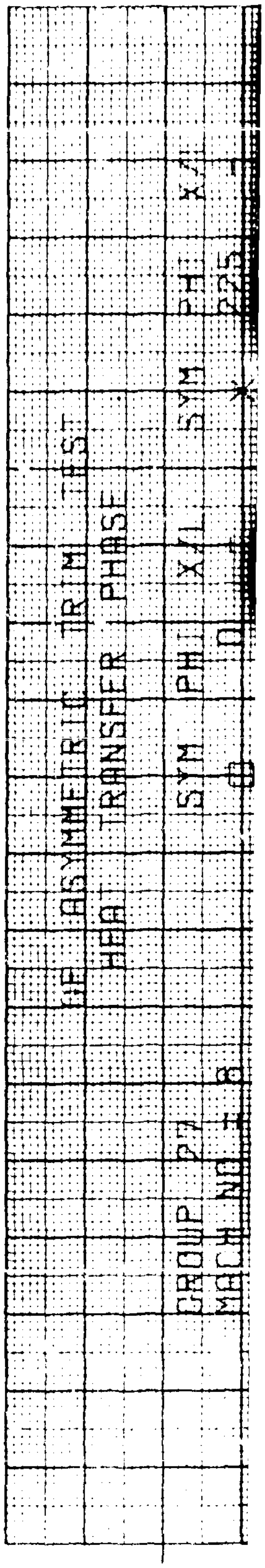
AEDC(ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0847-000

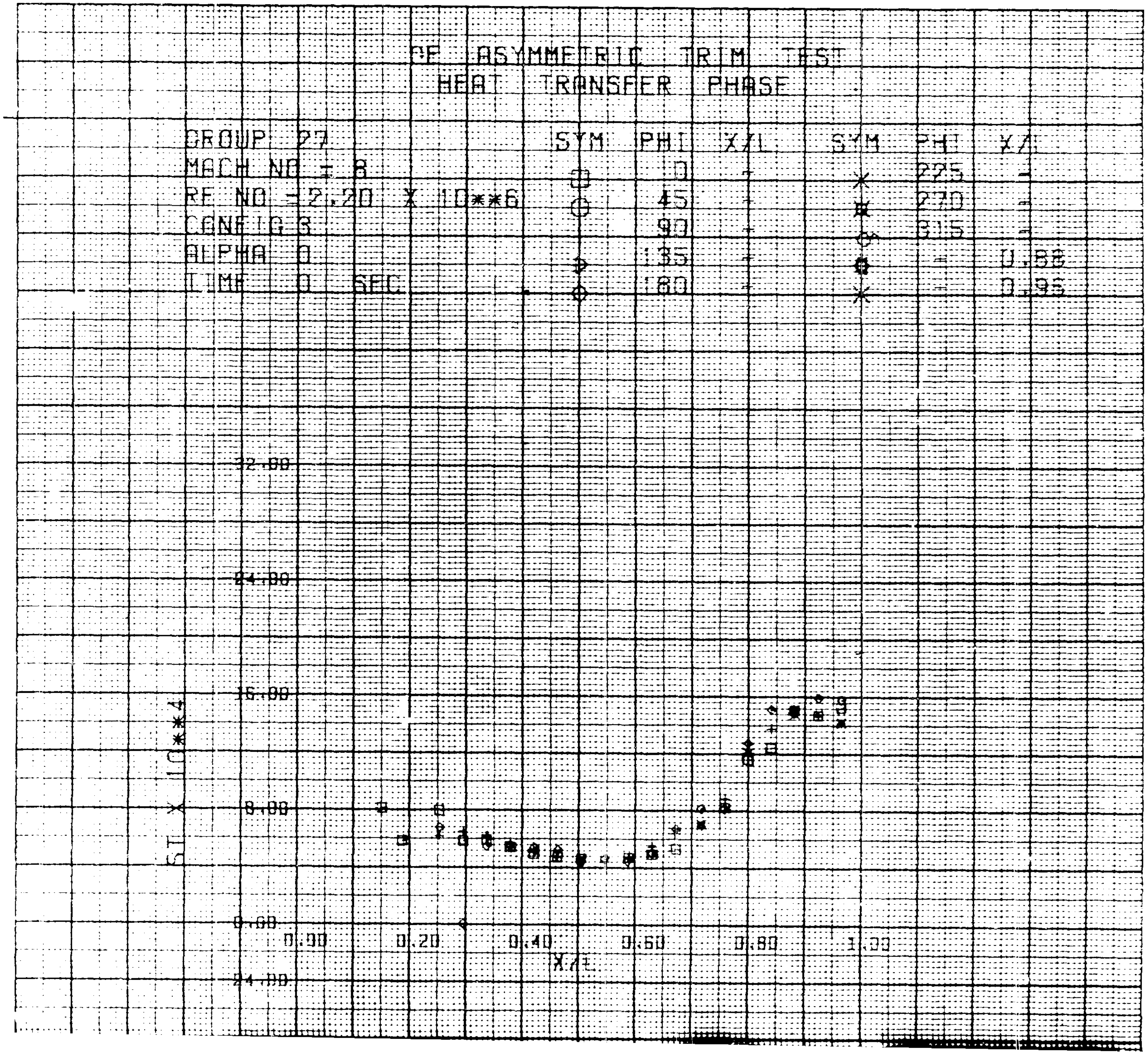
GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
27	3	.02	0	.02	0	0	716	7.97	472.37	1266.12	-.00

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9.34137E 01	4.07791E-02	2.17984E 00	3.70397E 03	4.30112E-05	7.52074E-08	2.20431E 06	2.02013E 06	3.14719E 02

TC NO	X/L	PHI	TEMP	SLOPE	B-STOA	HT	HM	HW	ST
1	.1500	0	497.31	3.4759E 00	8.4292E-01	1.0051E-03	4.3141E-03	1.1936E 02	8.0002E-04
2	.1867	0	481.96	2.7930E 00	6.1356E-01	7.4673E-04	3.0949E-03	1.1666E 02	5.8099E-04
3	.2524	0	480.55	2.8244E 00	8.3490E-01	1.0449E-03	4.2306E-03	1.1729E 02	7.9317E-04
4	.2943	0	500.92	1.9130E 00	6.0349E-01	7.4921E-04	3.1063E-03	1.2022E 02	5.8230E-04
5	.3362	0	504.44	1.8224E 00	6.0680E-01	7.7634E-04	3.1345E-03	1.2108E 02	5.8767E-04
6	.3783	0	508.17	1.8524E 00	5.5603E-01	7.1577E-04	2.8894E-03	1.2194E 02	5.4171E-04
7	.4203	0	510.22	1.7351E 00	5.0417E-01	6.4979E-04	2.6228E-03	1.2242E 02	4.9172E-04
8	.4623	0	514.28	1.7573E 00	4.8618E-01	6.2729E-04	2.5312E-03	1.2337E 02	4.7456E-04
9	.5043	0	515.86	1.7318E 00	4.6852E-01	6.041[illegible]E-04	2.4862E-03	1.2375E 02	4.6012E-04
10	.5463	0	530.96	2.2115E-02	4.2050E-03	8.2166E-06	3.3128E-05	1.2735E 02	6.2110E-06
11	.5882	0	520.75	1.7212E 00	4.7625E-01	6.1964E-04	2.4990E-03	1.2492E 02	4.8464E-04
12	.6302	0	523.02	1.8393E 00	4.9761E-01	6.5277E-04	2.6324E-03	1.2565E 02	4.9361E-04
13	.6722	0	525.46	2.1369E 00	5.3532E-01	7.0191E-04	2.8311E-03	1.2557E 02	5.3070E-04
99	.8822	315.0	539.98	4.7731E 00	1.1392E 00	1.5260E-03	6.1546E-03	1.2950E 02	1.1634E-03
15	.7583	0	532.22	3.1983E 00	8.1722E-01	1.0868E-03	4.3701E-03	1.2765E 02	8.1931E-04
16	.7996	0	534.76	4.1116E 00	1.1536E 00	1.5354E-03	6.1001E-03	1.2825E 02	1.1603E-03
17	.8409	0	535.47	4.4212E 00	1.2319E 00	1.6411E-03	6.6140E-03	1.2842E 02	1.2402E-03
18	.8822	0	539.15	5.0377E 00	1.4075E 00	1.9914E-03	8.0252E-03	1.2930E 02	1.5046E-03
19	.9235	0	539.51	5.8019E 00	1.4535E 00	1.9468E-03	7.8454E-03	1.2939E 02	1.4709E-03
20	.9648	0	537.82	6.2826E 00	1.5100E 00	2.0109E-03	8.1341E-03	1.2894E 02	1.5252E-03
21	.2524	45.0	483.98	2.9224E 00	7.4564E-01	9.2957E-04	3.7574E-03	1.1621E 02	7.0445E-04
22	.2943	45.0	496.09	2.0749E 00	6.6524E-01	8.4264E-04	3.4037E-03	1.1971E 02	6.3813E-04
23	.3363	45.0	500.80	1.9921E 00	5.9883E-01	7.6256E-04	3.0705E-03	1.2020E 02	5.7736E-04
24	.3783	45.0	504.59	1.8081E 00	5.6755E-01	7.2820E-04	2.9321E-03	1.2109E 02	5.4972E-04
25	.4203	45.0	508.26	1.6807E 00	4.6743E-01	6.0098E-04	2.4247E-03	1.2196E 02	4.5478E-04
26	.4623	45.0	513.09	1.4951E 00	4.7560E-01	6.1524E-04	2.4829E-03	1.2311E 02	4.6551E-04
27	.5043	45.0	515.44	1.7516E 00	4.6490E-01	6.0333E-04	2.4345E-03	1.2366E 02	4.5643E-04
100	.9648	315.0	541.25	5.8872E 00	1.3677E 00	1.8361E-03	7.3980E-03	1.2980E 02	1.3871E-03
29	.5882	45.0	520.28	1.7735E 00	4.8864E-01	6.3797E-04	2.5737E-03	1.2479E 02	4.8252E-04
30	.6302	45.0	522.88	1.9176E 00	5.1080E-01	6.7974E-04	2.7417E-03	1.2543E 02	5.1403E-04
31	.6722	45.0	524.57	2.4946E 00	6.3685E-01	8.3631E-04	3.3730E-03	1.2584E 02	6.3237E-04
32	.7170	45.0	528.19	3.0544E 00	7.1939E-01	9.4915E-04	3.8273E-03	1.2669E 02	7.1755E-04
33	.7583	45.0	533.10	3.9497E 00	9.3673E-01	1.2440E-03	5.0140E-03	1.2786E 02	9.4019E-04
34	.7996	45.0	535.87	4.1768E 00	1.2281E 00	1.6369E-03	6.5977E-03	1.2852E 02	1.2369E-03
35	.8409	45.0	539.09	5.2546E 00	1.4216E 00	1.9030E-03	7.6609E-03	1.2928E 02	1.4370E-03
36	.8822	45.0	541.15	5.1937E 00	1.4187E 00	1.9043E-03	7.6730E-03	1.2978E 02	1.4387E-03
37	.9235	45.0	541.87	5.5860E 00	1.4060E 00	1.8953E-03	7.6146E-03	1.2995E 02	1.4280E-03
38	.9648	45.0	539.01	5.4100E 00	1.3024E 00	1.7447E-03	7.0309E-03	1.2941E 02	1.3182E-03
39	.2524	90.0	485.21	2.1889E 00	6.4705E-01	8.0789E-04	3.2694E-03	1.1650E 02	6.1220E-04
40	.2943	90.0	497.62	2.0887E 00	6.6969E-01	8.4932E-04	3.4305E-03	1.1944E 02	6.4316E-04
41	.3363	90.0	502.23	2.0126E 00	6.3522E-01	8.1034E-04	3.2722E-03	1.2053E 02	6.1349E-04
42	.3783	90.0	506.26	1.7634E 00	5.5672E-01	7.1387E-04	2.8820E-03	1.2148E 02	5.4033E-04
43	.4203	90.0	509.74	1.7582E 00	5.1973E-01	6.6943E-04	2.7021E-03	1.2231E 02	5.0660E-04
44	.4623	90.0	511.80	1.5505E 00	4.8164E-01	6.2281E-04	2.5104E-03	1.2280E 02	4.7066E-04
45	.5043	90.0	514.42	1.6407E 00	4.5426E-01	5.8869E-04	2.3754E-03	1.2342E 02	4.4535E-04
46	.5463	90.0	518.37	1.4503E 00	4.4273E-01	5.7666E-04	2.3245E-03	1.2436E 02	4.3019E-04
47	.5882	90.0	519.39	1.4913E 00	4.7654E-01	6.1892E-04	2.4969E-03	1.2460E 02	4.6812E-04
48	.6302	90.0	521.04	2.0079E 00	5.5325E-01	7.2312E-04	2.9170E-03	1.2499E 02	5.4089E-04
49	.6722	90.0	522.77	2.4630E 00	6.4229E-01	8.4141E-04	3.3939E-03	1.2540E 02	6.3629E-04
50	.7170	90.0	527.05	2.9591E 00	6.9603E-01	9.1880E-04	3.7019E-03	1.2642E 02	6.9405E-04
51	.7583	90.0	530.31	3.3919E 00	8.8358E-01	1.1691E-03	4.7135E-03	1.2720E 02	8.8370E-04
52	.7996	90.0	533.49	4.6120E 00	1.2014E 00	1.5963E-03	6.4350E-03	1.2795E 02	1.2065E-03
53	.8409	90.0	535.64	5.4464E 00	1.3644E 00	1.8181E-03	7.3281E-03	1.2846E 02	1.3739E-03
54	.8822	90.0	538.29	6.6027E 00	1.4735E 00	1.9705E-03	7.9414E-03	1.2911E 02	1.4889E-03
55	.9235	90.0	538.37	6.6318E 00	1.4505E 00	1.9398E-03	7.8179E-03	1.2911E 02	1.4657E-03
56	.9648	90.0	534.38	5.9430E 00	1.4051E 00	1.8692E-03	7.5346E-03	1.2816E 02	1.4126E-03
57	.2524	135.0	482.06	5.8792E-01	1.5015E-01	1.8674E-04	7.5488E-04	1.1579E 02	1.4153E-04
58	.2943	135.0	493.34	2.1161E 00	6.7845E-01	8.5579E-04	3.4574E-03	1.1842E 02	6.4821E-04
59	.3363	135.0	497.24	2.1728E 00	6.8582E-01	8.6946E-04	3.5119E-03	1.1937E 02	6.5842E-04
60	.3783	135.0	500.58	1.6892E 00	5.2474E-01	6.6800E-04	2.6977E-03	1.2014E 02	5.0577E-04
61	.4203	135.0	503.81	1.8806E 00	5.4127E-01	6.9170E-04	2.7929E-03	1.2085E 02	5.2363E-04
62	.4623	135.0	506.50	1.7399E 00	5.0553E-01	6.4843E-04	2.6178E-03	1.2154E 02	4.9079E-04
63	.5043	135.0	509.39	1.7481E 00	4.46[illegible]5E-01	5.7503E-04	2.3211E-03	1.2223E 02	4.3517E-04
64	.5463	135.0	511.30	1.8151E 00	4.8201E-01	6.2216E-04	2.5111E-03	1.2270E 02	4.7078E-04
65	.5882	135.0	513.49	1.3641E 00	3.622[illegible]E-01	4.6883E-04	1.8920E-03	1.2320E 02	3.5472E-04
66	.6302	135.0	515.26	2.1724E 00	5.7689E-01	7.4637E-04	3.0194E-03	1.2362E 02	5.6617E-04
67	.6722	135.0	517.55	2.6362E 00	6.3396E-01	8.2485E-04	3.3280E-03	1.2416E 02	6.2395E-04
68	.7170	135.0	520.63	3.1127E 00	7.8010E-01	1.0191E-03	4.1110E-03	1.2490E 02	7.7075E-04
69	.7583	135.0	523.13	2.6086E 00	7.3196E-01	9.5930E-04	3.8693E-03	1.2549E 02	7.2543E-04
70	.7996	135.0	528.08	4.4187E 00	1.3420E 00	1.7704E-03	7.1389E-03	1.2667E 02	1.3384E-03
71	.8409	135.0	530.34	4.9513E 00	1.3642E 00	1.8051E-03	7.2778E-03	1.2720E 02	1.364[illegible]E-03
72	.8822	135.0	531.81	5.4666E 00	1.5530E 00	2.0324E-03	8.1936E-03	1.2755E 02	1.5362E-03
73	.9235	135.0	532.09	5.8032E 00	1.6392E 00	1.9087E-03	7.6951E-03	1.2762E 02	1.4427E-03
74	.9648	135.0	532.11	6.1429E 00	1.4[illegible] 00	1.[illegible]E-03	7.[illegible]E-03	1.27[illegible] 02	1.[illegible]E-03
75	.2524	180.0	482.98	2.4570E 00	7.1392E-01	8.[illegible]891E-04	3.5932E-03	1.1597E 02	6.7367E-04
76	.2943	180.0	-116.76	-1.1546E-14	-3.7020E-15	-2.6388E-18	-1.1028E-17	-2.1036E 01	-2.0676E-18
77	.3363	180.0	501.80	1.9170E 00	5.6647E-01	7.2250E-04	2.9174E-03	1.2043E 02	5.4690E-04
78	.3783	180.0	505.50	1.8821E 00	5.6576E-01	7.2475E-04	2.9261E-03	1.2130E 02	5.4859E-04
79	.4203	180.0	508.57	1.8638E 00	5.5094E-01	7.0856E-04	2.8582E-03	1.2203E 02	5.3624E-04
80	.4623	180.0	511.80	1.8712E 00	5.3639E-01	6.9008E-04	2.7852E-03	1.2280E 02	5.2217E-04
81	.5043	180.0	514.60	1.7649E 00	4.4214E-01	5.7315E-04	2.3128E-03	1.2349E 02	4.3362E-04
82	.5463	180.0	517.27	1.7595E 00	4.6723E-01	6.0769E-04	2.4519E-03	1.2410E 02	4.5969E-04
83	.5882	180.0	519.20	1.6773E 00	4.4741E-01	5.8078E-04	2.3431E-03	1.2456E 02	4.3928E-04
84	.6302	180.0	521.71	1.8062E 00	5.0620E-01	6.6221E-04	2.6712E-03	1.2519E 02	5.0081E-04
85	.6722	180.0	523.09	2.8041E 00	6.[illegible]34E-01	8.8645E-04	3.5673E-03	1.2562E 02	6.4881E-04
86	.7170	180.0	526.02	3.6635E 00	8.1562E-01	1.0742E-03	4.3318E-03	1.2637E 02	8.1214E-04
87	.7583	180.0	530.31	3.[illegible]806E 00	8.1009E-01	1.0[illegible]10E-03	4.3215E-03	1.2720E 02	8.1020E-04
88	.7996	180.0	534.77	4.8653E 00	1.2674E 00	1.6869E-03	6.7996E-03	1.2826E 02	1.2740E-03
89	.8409	180.0	536.01	5.4540E 00	1.4958E 00	1.9957E-03	8.0436E-03	1.2870E 02	1.5080E-03
90	.8822	180.0	537.97	6.6014E 00	1.4850E 00	1.9902E-03	8.0269E-03	1.2902E 02	1.5038E-03
91	.9235	180.0	538.97	6.3124E 00	1.5748E 00	2.1052E-03	8.4842E-03	1.2913E 02	1.5984E-03
92	.9648	180.0	537.04	5.7422E 00	1.5629E 00	2.0884E-03	8.4091E-03	1.2880E 02	1.5766E-03
93	.8822	225.0	540.37	5.7032E 00	1.4572E 00	1.9540E-03	7.8741E-03	1.2959E 02	1.4763E-03
94	.9648	225.0	538.16	5.4795E 00	1.4380E 00	1.9229E-03	7.7480E-03	1.2906E 02	1.4526E-03
95	.7170	270.0	533.52	3.1052E 00	7.0086E-01	9.3019E-04	3.7490E-03	1.2796E 02	7.0302E-04
96	.7996	270.0	542.38	4.4719E 00	1.1873E 00	1.5964E-03	6.4321E-03	1.3007E 02	1.2059E-03
97	.8822	270.0	545.11	5.5791E 00	1.4580E 00	1.9579E-03	7.8877E-03	1.3072E 02	1.4788E-03
98	.9648	270.0	541.14	5.4173E 00	1.3990E 00	1.8779E-03	7.5669E-03	1.2978E 02	1.4167E-03

105




OF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 27
MACH NO = 8
RE NO =2.20 X 10**6
CONFIG 3
ALPHA 0
TIME 0 SEC
SYM PHI X/L
□ 0 -
○ 45 -
◇ 90 -
⊕ 135 -
⊕ 180 -
SYM PHI X/L
✕ 225 -
⊠ 270 -
◇ 315 -
⊕ - 0.88
✕ - 0.95
32.00
24.00
16.00
8.00
0.00
24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

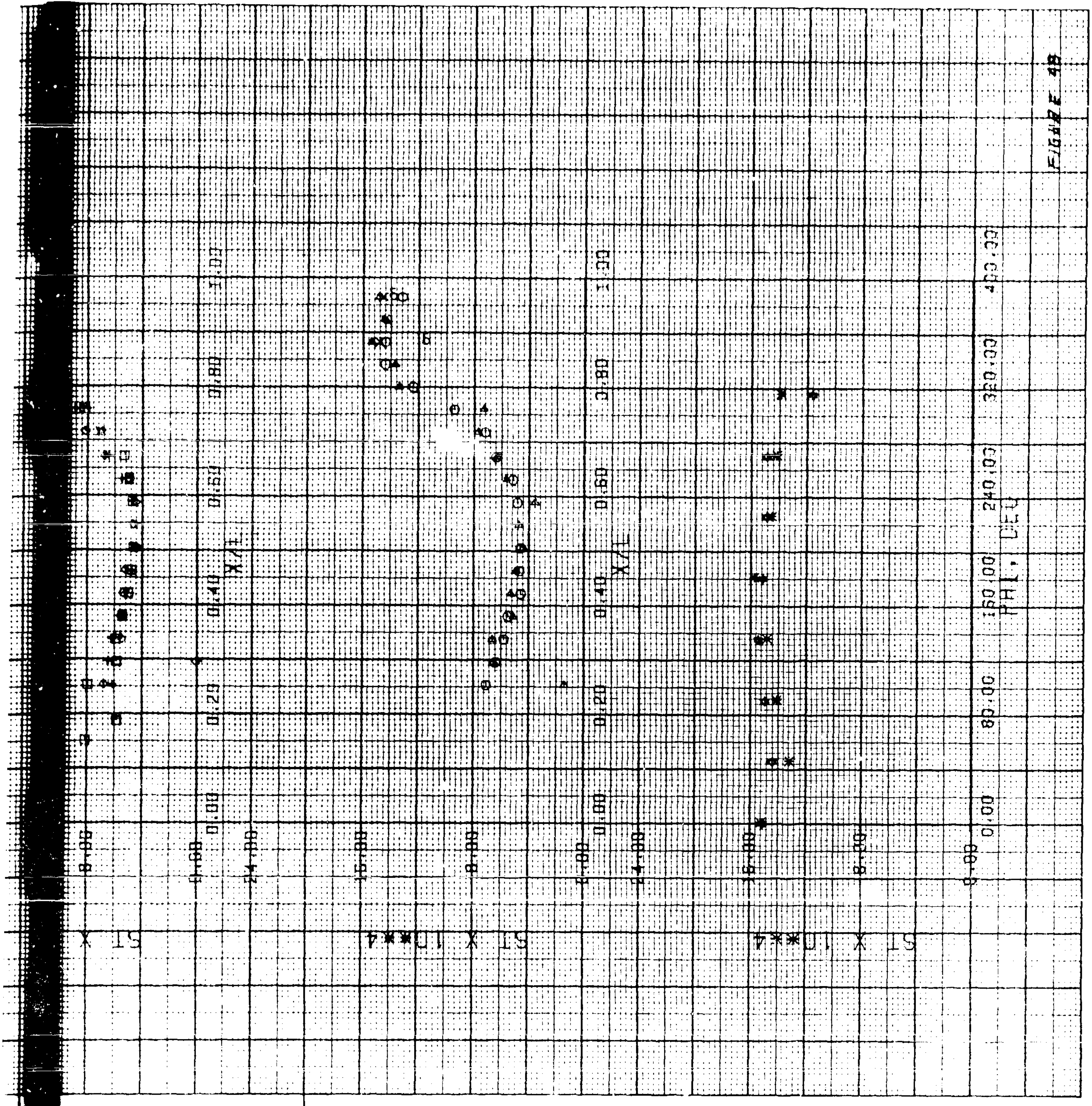


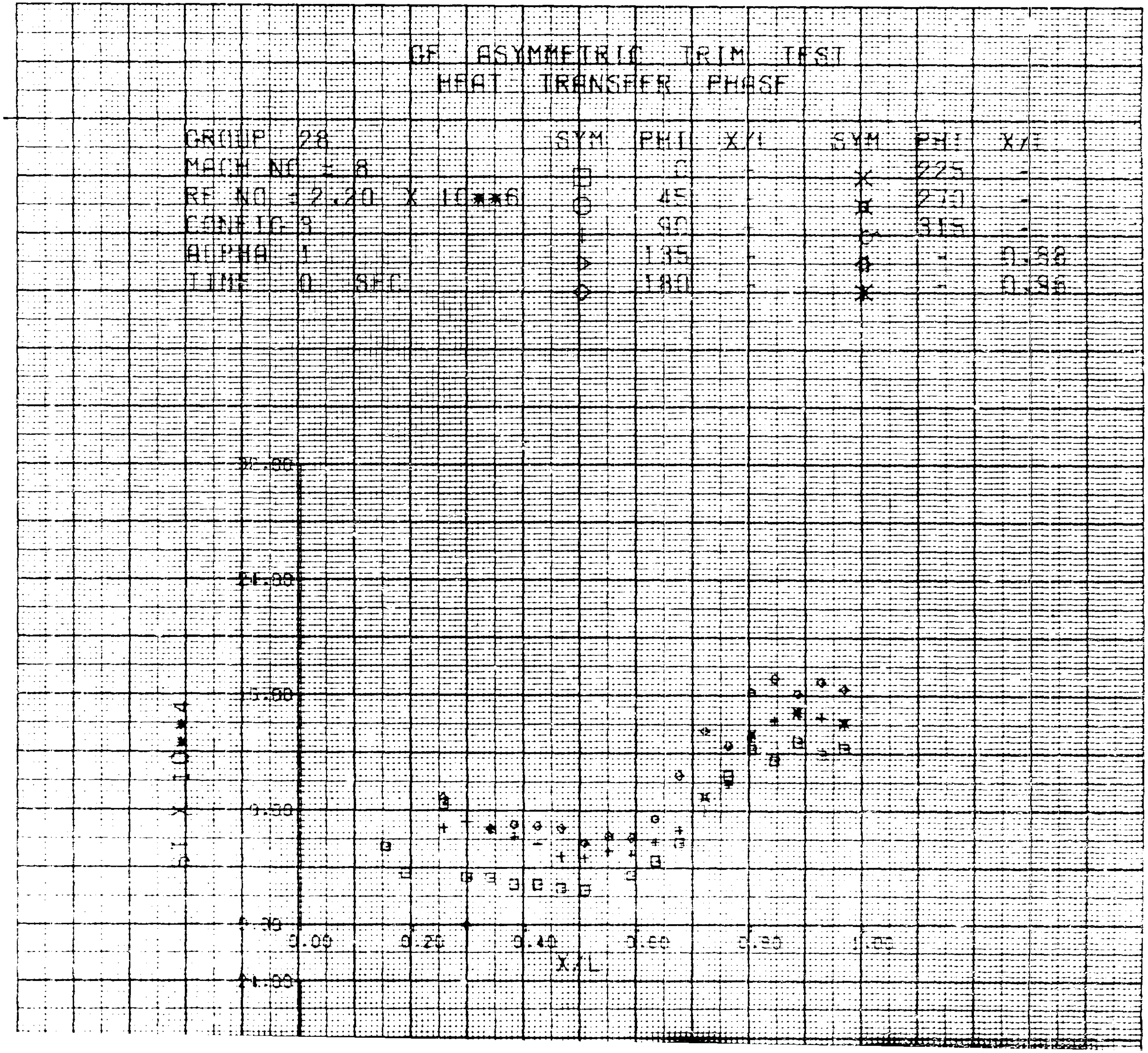
FIGURE 48
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
X/L
0.00
0.20
0.40
0.60
0.80
1.00
X/L
0.00
0.20
0.40
0.60
0.80
1.00
ST X 10**4
-8.00
8.00
16.00
24.00
ST X 10**4
-8.00
8.00
16.00
-8.00
8.00
ST X 10**4

Figure 48

3

```
                                        7/14/69

                         AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                           VON KARMAN GAS DYNAMICS FACILITY
                              50 INCH HYPERSONIC TUNNEL B
                                      VT0947-B00
GROUP  CONFIG    ALPHA-M      BETA-M        ALPHA-S     ROLL    ALP-P  DATE     MACH NO       PO        TO          TIME
[illegible]  3     1.09          0            1.09        0       0     714       7.99       472.5V   1286.04       .86
  T-INF        P-INF         Q-INF        V-INF        RHO-INF        MU-INF        RE/FT        RE/D          MU
 9.3467E 01  4.0709E-02   2.1803E 00   3.7838E 03   4.3823E-05   7.5202E-08   2.2050E 06   2.0222E 06   3.1468E 02

TC NO   X/L     PHI     TEMP     SLOPE         Q-STDW        HT           HM          HW           ST

   1   .1900      0    440.83  2.7099E 00   4.8800E-01  7.2190E-04  2.9243E-03  1.0725E 02  5.4012E-04
   2   .1867      0    458.51  1.4061E 00   3.9664E-01  4.7931E-04  1.9461E-03  1.1019E 02  3.6365E-04
   3   .2524      0    470.50  1.1058E 00   9.1811E-01  1.1250E-03  4.5519E-03  1.1302E 02  8.5357E-04
   4   .2943      0    476.67  1.1381E 00   3.5921E-01  4.4379E-04  1.7940E-03  1.1447E 02  3.3037E-04
   5   .3363      0    484.50  1.1126E 00   3.5116E-01  4.3011E-04  1.7709E-03  1.1433E 02  3.3192E-04
   6   .3783      0    490.76  9.9552E-01   2.9925E-01  3.7629E-04  1.5209E-03  1.1741E 02  2.8499E-04
   7   .4203      0    495.22  1.0281E 00   2.9900E-01  3.7409E-04  1.5214E-03  1.1887E 02  2.8620E-04
   8   .4623      0    499.94  9.4011E-01   2.7805E-01  3.4353E-04  1.3079E-03  1.1990E 02  2.6005E-04
   9   .5043      0    502.94  9.1846E-01   2.5195E-01  3.2429E-04  1.3094E-03  1.2070E 02  2.4544E-04
  10   .5463      0    531.96  1.2629E-01   3.5570E-02  4.7178E-05  1.9020E-04  1.2759E 02  3.5650E-05
  11   .5882      0    510.20  1.2930E 00   3.5667E-01  4.5946E-04  1.8546E-03  1.2242E 02  3.4761E-04
  12   .6302      0    513.25  1.4961E 00   4.3005E-01  5.9377E-04  2.3942E-03  1.2314E 02  4.4914E-04
  13   .6722      0    517.81  2.3602E 00   5.9127E-01  7.6946E-04  3.1045E-03  1.2410E 02  5.8190E-04
  14   .8822    315.0  534.76  3.6763E 00   9.3164E-01  1.2401E-03  4.9986E-03  1.2825E 02  9.3693E-04
  15   .7583      0    523.04  4.1965E 00   1.0573E 00  1.3057E-03  5.5091E-03  1.2547E 02  1.0476E-03
  16   .7996      0    526.12  4.4230E 00   1.2412E 00  1.6334E-03  6.5071E-03  1.2620E 02  1.2347E-03
  17   .8409      0    526.87  4.5360E 00   1.1590E 00  1.5267E-03  6.1545E-03  1.2630E 02  1.1540E-03
  18   .8822      0    530.00  5.1173E 00   1.2020E 00  1.6957E-03  6.8369E-03  1.2712E 02  1.2815E-03
  19   .9235      0    530.88  4.7769E 00   1.1967E 00  1.5867E-03  6.3863E-03  1.2733E 02  1.1976E-03
  20   .9648      0    534.44  5.1205E 00   1.2314E 00  1.6384E-03  6.6059E-03  1.2818E 02  1.2379E-03
  21   .2524     45.0  443.65  2.0949E 00   6.1926E-01  7.5301E-04  3.0471E-03  1.1140E 02  5.7114E-04
  22   .2943     45.0  468.26  1.8239E 00   5.0477E-01  7.1507E-04  2.8829E-03  1.1249E 02  5.4223E-04
  23   .3363     45.0  475.70  1.7819E 00   5.3563E-01  6.6100E-04  2.6710E-03  1.1625E 02  5.0102E-04
  24   .3783     45.0  482.57  1.7224E 00   5.1774E-01  [illegible]  [illegible]  [illegible]  [illegible]
  25   .4203     45.0  488.47  1.5855E 00   4.8067E-01  5.7756E-04  2.3360E-03  1.1726E 02  4.3740E-04
  26   .4623     45.0  495.12  1.5341E 00   4.3044E-01  5.4423E-04  2.1985E-03  1.1884E 02  4.1208E-04
  27   .5043     45.0  498.98  1.5651E 00   4.1029E-01  5.2130E-04  2.1054E-03  1.1976E 02  3.9463E-04
 100   .9648    315.0  540.03  5.4230E 00   1.3041E 00  1.7481E-03  7.0445E-03  1.2951E 02  1.3204E-03
  29   .5882     45.0  505.97  1.4812E 00   4.0813E-01  5.2319E-04  2.1123E-03  1.2142E 02  3.9592E-04
  30   .6302     45.0  509.06  1.4850E 00   4.0175E-01  5.1706E-04  2.0872E-03  1.2215E 02  3.9121E-04
  31   .6722     45.0  515.70  1.8648E 00   4.4302E-01  5.7510E-04  2.3206E-03  1.2372E 02  4.3497E-04
  32   .7170     45.0  519.09  2.1902E 00   5.1577E-01  6.7312E-04  2.7155E-03  1.2470E 02  5.0899E-04
  33   .7583     45.0  519.17  2.4468E 00   6.7417E-01  8.7912E-04  3.5467E-03  1.2455E 02  6.6478E-04
  34   .7996     45.0  522.17  3.0310E 00   8.5067E-01  1.1136E-03  4.4921E-03  1.2526E 02  8.4190E-04
  35   .8409     45.0  525.41  3.9190E 00   1.0682E 00  1.3939E-03  5.6216E-03  1.2603E 02  1.0537E-03
  36   .8822     45.0  527.09  4.9549E 00   1.1980E 00  1.5796E-03  6.3649E-03  1.2655E 02  1.1930E-03
  37   .9235     45.0  529.01  5.1601E 00   1.3185E 00  1.7417E-03  7.0278E-03  1.2689E 02  1.3163E-03
  38   .9648     45.0  534.60  9.2153E 00   1.2542E 00  1.6690E-03  6.7270E-03  1.2822E 02  1.2610E-03
  39   .2524     90.0  465.61  2.4877E 00   7.3529E-01  8.9635E-04  3.6260E-03  1.1107E 02  6.7979E-04
  40   .2943     90.0  469.46  2.4190E 00   7.7576E-01  9.5002E-04  3.8431E-03  1.1277E 02  7.2034E-04
  41   .3363     90.0  476.21  2.2863E 00   7.2099E-01  8.9030E-04  3.6002E-03  1.1437E 02  6.7481E-04
  42   .3783     90.0  483.36  2.0825E 00   6.5731E-01  8.1890E-04  3.3102E-03  1.1606E 02  6.2046E-04
  43   .4203     90.0  489.86  2.0369E 00   6.0214E-01  7.5551E-04  3.0530E-03  1.1740E 02  5.7224E-04
  44   .4623     90.0  493.14  1.4263E 00   5.0519E-01  6.3714E-04  2.5741E-03  1.1836E 02  4.8240E-04
  45   .5043     90.0  497.50  1.7661E 00   5.8661E-01  6.1711E-04  2.4926E-03  1.1941E 02  4.6720E-04
  46   .5463     90.0  502.57  1.8580E 00   5.3083E-01  6.7753E-04  2.7359E-03  1.2061E 02  5.1281E-04
  47   .5882     90.0  504.96  1.7940E 00   5.0336E-01  6.4444E-04  2.6019E-03  1.2118E 02  4.8770E-04
  48   .6302     90.0  507.07  2.1851E 00   6.0206E-01  7.7291E-04  3.1202E-03  1.2168E 02  5.8485E-04
  49   .6722     90.0  513.67  2.4984E 00   6.7480E-01  8.7263E-04  3.5216E-03  1.2324E 02  6.6007E-04
  50   .7170     90.0  518.06  3.4444E 00   8.1113E-01  1.0573E-03  4.2655E-03  1.2447E 02  7.9951E-04
  51   .7583     90.0  515.85  3.8724E 00   1.0000E 00  1.3098E-03  5.2850E-03  1.2376E 02  9.9061E-04
  52   .7996     90.0  519.49  5.1084E 00   1.3307E 00  1.7360E-03  7.0030E-03  1.2462E 02  1.3127E-03
  53   .8409     90.0  521.90  5.7755E 00   1.4469E 00  1.8935E-03  7.6378E-03  1.2520E 02  1.4316E-03
  54   .8822     90.0  524.44  6.1070E 00   1.4991E 00  1.9684E-03  7.9300E-03  1.2581E 02  1.4881E-03
  55   .9235     90.0  524.97  6.1072E 00   1.4687E 00  1.9298E-03  7.7829E-03  1.2593E 02  1.4588E-03
  56   .9648     90.0  529.56  9.8505E 00   1.4064E 00  1.8598E-03  7.4989E-03  1.2701E 02  1.4056E-03
  57   .2524    135.0  463.10  7.4430E-01   2.2085E-01  2.6739E-04  1.0821E-03  1.1127E 02  2.0282E-04
  58   .2943    135.0  470.65  2.7437E 00   8.9250E-01  1.0946E-03  4.4276E-03  1.1308E 02  8.2990E-04
  59   .3363    135.0  476.34  2.7639E 00   7.4613E-01  9.2151E-04  3.7264E-03  1.1440E 02  6.9846E-04
  60   .3783    135.0  482.70  2.2779E 00   7.0759E-01  8.8081E-04  3.5606E-03  1.1590E 02  6.6739E-04
  61   .4203    135.0  487.44  2.2786E 00   6.8496E-01  8.5771E-04  3.4663E-03  1.1703E 02  6.4971E-04
  62   .4623    135.0  492.27  2.0521E 00   5.9626E-01  7.5118E-04  3.0350E-03  1.1817E 02  5.6887E-04
  63   .5043    135.0  496.33  2.2402E 00   5.7751E-01  7.3129E-04  2.9540E-03  1.1913E 02  5.5360E-04
  64   .5463    135.0  499.53  2.2345E 00   5.9336E-01  7.5443E-04  3.0469E-03  1.1989E 02  5.7110E-04
  65   .5882    135.0  503.27  2.6647E 00   7.0762E-01  9.0399E-04  3.6502E-03  1.2078E 02  6.8418E-04
  66   .6302    135.0  505.49  2.8747E 00   7.6330E-01  9.7799E-04  3.9485E-03  1.2130E 02  7.4010E-04
  67   .6722    135.0  512.87  3.7946E 00   9.1252E-01  1.1790E-03  4.7584E-03  1.2206E 02  8.9190E-04
  68   .7170    135.0  516.49  4.8368E 00   1.1390E 00  1.4861E-03  5.9722E-03  1.2391E 02  1.1194E-03
  69   .7583    135.0  514.28  3.8945E 00   1.0927E 00  1.4150E-03  5.7137E-03  1.2339E 02  1.0710E-03
  70   .7996    135.0  520.49  5.9050E 00   1.7159E 00  2.2413E-03  9.0415E-03  1.2485E 02  1.6947E-03
  71   .8409    135.0  523.27  5.9317E 00   1.6068E 00  2.1065E-03  8.4947E-03  1.2552E 02  1.5926E-03
  72   .8822    135.0  524.17  [illegible]  [illegible]  [illegible]  [illegible]  1.2573E 02  [illegible]
  73   .9235    135.0  524.89  6.1585E 00   1.5117E 00  1.9859E-03  8.0046E-03  1.2589E 02  1.5013E-03
  74   .9648    135.0  530.64  6.3721E 00   1.5324E 00  2.0285E-03  8.1788E-03  1.2727E 02  1.5330E-03
  75   .2524    180.0  470.34  3.2853E 00   9.5457E-01  1.1703E-03  4.7339E-03  1.1299E 02  8.8731E-04
  76   .2943    180.0 -116.74  6.1927E-08   1.9055E-08  1.4154E-11  5.9151E-11 -2.1036E 01  1.1007E-11
  77   .3363    180.0  485.89  2.4032E 00   7.1041E-01  8.8791E-04  3.5882E-03  1.1645E 02  6.7257E-04
  78   .3783    180.0  491.90  2.4392E 00   7.3324E-01  9.2331E-04  3.7305E-03  1.1808E 02  6.9924E-04
  79   .4203    180.0  496.57  2.4375E 00   7.2054E-01  9.1270E-04  3.6867E-03  1.1919E 02  6.9102E-04
  80   .4623    180.0  501.29  2.4619E 00   7.0305E-01  8.9590E-04  3.6179E-03  1.2031E 02  6.7813E-04
  81   .5043    180.0  505.19  2.3729E 00   5.9446E-01  7.6131E-04  3.0737E-03  1.2123E 02  5.7613E-04
  82   .5463    180.0  509.09  2.4230E 00   6.4343E-01  8.2810E-04  3.3427E-03  1.2215E 02  6.2655E-04
  83   .5882    180.0  512.86  2.9683E 00   6.2091E-01  8.1256E-04  3.2794E-03  1.2206E 02  6.1469E-04
  84   .6302    180.0  515.69  2.9631E 00   7.6030E-01  9.8694E-04  3.9825E-03  1.2372E 02  7.4646E-04
  85   .6722    180.0  521.33  4.8868E 00   1.0596E 00  1.3866E-03  5.5903E-03  1.2506E 02  1.0476E-03
  86   .7170    180.0  525.95  5.7963E 00   1.3050E 00  1.7958E-03  7.2023E-03  1.2616E 02  1.3375E-03
  87   .7583    180.0  524.67  5.2588E 00   1.2646E 00  1.6610E-03  6.6900E-03  1.2585E 02  1.2556E-03
  88   .7996    180.0  530.52  6.2549E 00   1.6294E 00  2.1567E-03  8.6994E-03  1.2724E 02  1.6298E-03
  89   .8409    180.0  532.41  6.7369E 00   1.7214E 00  2.2841E-03  9.2082E-03  1.2769E 02  1.7259E-03
  90   .8822    180.0  533.61  6.9888E 00   1.6105E 00  2.1404E-03  8.6284E-03  1.2798E 02  1.6173E-03
  91   .9235    180.0  534.69  6.4947E 00   1.6924E 00  2.2518E-03  9.0771E-03  1.2818E 02  1.7014E-03
  92   .9648    180.0  537.68  7.0860E 00   1.6331E 00  2.1022E-03  8.7951E-03  1.2895E 02  1.6485E-03
  93   .8822    225.0  534.83  6.1362E 00   1.5679E 00  2.0927E-03  8.4346E-03  1.2875E 02  1.5809E-03
  94   .9648    225.0  539.23  6.1673E 00   1.4703E 00  1.9795E-03  7.9774E-03  1.2932E 02  1.4953E-03
  95   .7170    270.0  530.37  7.9669E 00   8.9433E-01  1.1834E-03  4.7715E-03  1.2720E 02  8.9435E-04
  96   .7996    270.0  535.70  4.9863E 00   1.3241E 00  1.7647E-03  7.1131E-03  1.2848E 02  1.3333E-03
  97   .8822    270.0  539.56  5.7602E 00   1.4718E 00  1.9716E-03  7.9444E-03  1.2934E 02  1.4893E-03
  98   .9648    270.0  541.12  5.7946E 00   1.3935E 00  1.8706E-03  7.5379E-03  1.2977E 02  1.4129E-03
```

OF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 28
MACH NO = 8
RE NO = 2.20 X 10**6
CONFIG 3
ALPHA 1
TIME 0 SEC
SYM PHI X/L
□ 0 -
○ 45 -
+ 90 -
△ 135 -
◇ 180 -
SYM PHI X/L
× 225 -
⌘ 270 -
○ 315 -
⌖ - 0.88
✱ - 0.96
0.50
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

2

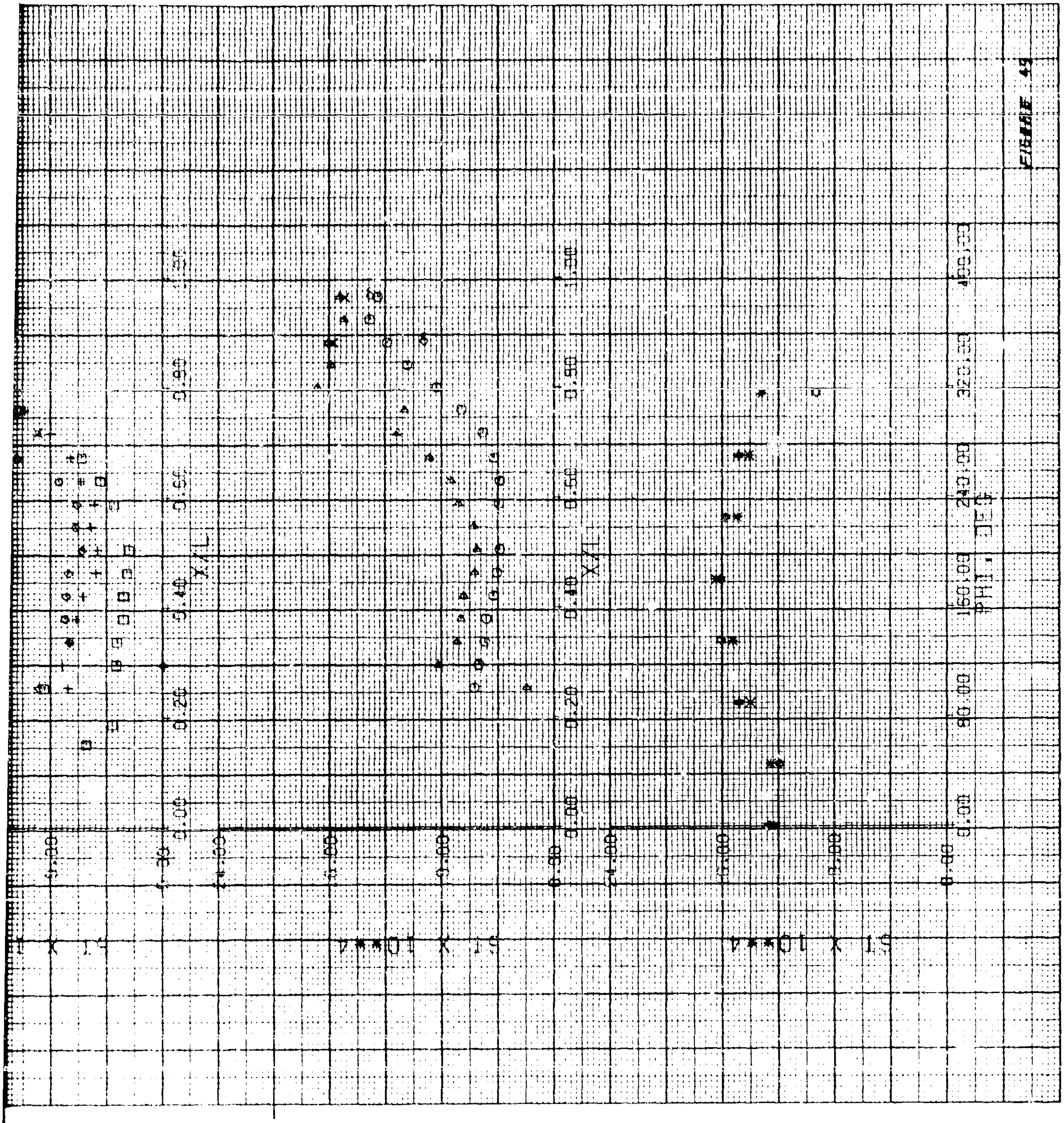


FIGURE 49
XZL
0.00
0.20
0.40
0.60
0.80
1.00
XZ
0.00
0.20
0.40
0.60
0.80
1.00
PHI, DEG
0.00
80.00
160.00
240.00
320.00
400.00
ST X 10**4
ST X 10**4

Figure 49

```
                                          7/16/69

                          AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                           VON KARMAN GAS DYNAMICS FACILITY
                             50 INCH HYPERSONIC TUNNEL B
                                     VT0967-800
GROUP   CONFIG     ALPHA-M      BETA-M        ALPHA-S     ROLL    ALP-P   DATE     MACH NO        PO          TO          TIME
  29       3         2.05          0            2.05        0        0     716      7.99        471.57     1309.00          .50
   T-INF        P-INF         Q-INF        V-INF        RHO-INF       MU-INF       RE/FT         RE/D          HO
 9.3623E 01  4.0675E-02  2.1752E 00  3.7802E 03  6.3620E-05  7.5375E-08  2.4922E 06  8.0107E 06  3.5390E 02

TC NO   X/L     PHI    TEMP     SLOPE        Q-STDW        HT           HM           HW          ST

  1   .1580      0    455.05  1.7980E 00  3.8273E-01  4.5898E-04  1.0579E-03  1.0994E 02  3.6937E-04
  2   .1067      0    465.67  1.6094E 00  2.3405E-01  2.0526E-04  1.1539E-03  1.1108E 02  2.1705E-04
  3   .2524      0    474.98  2.7573E 00  8.1509E-01  1.0013E-03  4.6480E-03  1.1408E 02  7.6154E-04
  4   .2943      0    482.21  9.9613E-01  1.7553E-01  2.1757E-04  8.7937E-04  1.1579E 02  1.6540E-04
  5   .3363      0    488.00  4.9220E-01  1.5530E-01  1.9390E-04  7.8379E-04  1.1716E 02  1.4742E-04
  6   .3783      0    492.06  9.2536E-01  1.5793E-01  1.9617E-04  8.0053E-04  1.1912E 02  1.5037E-04
  7   .4203      0    495.68  7.4263E-01  2.1574E-01  2.7179E-04  1.0978E-03  1.1863E 02  2.0640E-04
  8   .4623      0    498.38  5.1766E-01  1.4794E-01  1.8716E-04  7.5582E-04  1.1962E 02  1.4216E-04
  9   .5043      0    500.04  6.6572E-01  1.8011E-01  2.2845E-04  9.2265E-04  1.2015E 02  1.7350E-04
 10   .5463      0    532.35  1.2792E-01  3.5892E-02  4.7034E-05  1.9120E-04  1.2764E 02  3.5903E-05
 11   .5882      0    506.78  1.1910E 00  3.2832E-01  4.1972E-04  1.6942E-03  1.2101E 02  3.1906E-04
 12   .6302      0    509.67  1.4708E 00  5.3317E-01  6.6413E-04  2.7610E-03  1.2229E 02  5.1932E-04
 13   .6722      0    515.47  2.6905E 00  6.7401E-01  8.7135E-04  3.5155E-03  1.2367E 02  6.6123E-04
 14   .8822  315.0    514.55  3.9234E 00  9.1784E-01  1.2166E-03  4.9011E-03  1.2829E 02  9.2223E-04
 15   .7583      0    519.47  4.2960E 00  1.0333E 00  1.3428E-03  5.4162E-03  1.2462E 02  1.0187E-03
 16   .7996      0    521.96  3.8612E 00  1.0834E 00  1.4124E-03  5.6964E-03  1.2521E 02  1.0714E-03
 17   .8409      0    522.57  3.8233E 00  9.7608E-01  1.2746E-03  5.1409E-03  1.2534E 02  9.6685E-04
 18   .8822      0    525.65  4.2874E 00  1.0791E 00  1.4071E-03  5.6736E-03  1.2609E 02  1.0672E-03
 19   .9235      0    526.76  4.0310E 00  1.0099E 00  1.3248E-03  5.3618E-03  1.2635E 02  1.0047E-03
 20   .9648      0    532.13  4.2498E 00  1.0220E 00  1.3503E-03  5.4427E-03  1.2763E 02  1.0237E-03
 21   .2524   45.0    462.03  2.1718E 00  6.4190E-01  7.7684E-04  3.1432E-03  1.1116E 02  5.9121E-04
 22   .2943   45.0    466.60  1.9085E 00  6.1189E-01  7.4403E-04  3.0098E-03  1.1210E 02  5.6412E-04
 23   .3363   45.0    472.33  1.9184E 00  5.7666E-01  7.0611E-04  2.8595E-03  1.1349E 02  5.3718E-04
 24   .3783   45.0    478.05  1.7795E 00  5.3492E-01  6.5962E-04  2.6067E-03  1.1480E 02  5.0150E-04
 25   .4203   45.0    482.72  1.4412E 00  4.7685E-01  5.9142E-04  2.3906E-03  1.1591E 02  4.4961E-04
 26   .4623   45.0    488.96  1.5981E 00  4.4834E-01  5.6045E-04  2.2644E-03  1.1739E 02  4.2592E-04
 27   .5043   45.0    492.74  1.4231E 00  4.3102E-01  5.4130E-04  2.1846E-03  1.1828E 02  4.1120E-04
[illegible] .9648  315.0  540.29  4.4439E 00  1.1047E 00  1.5596E-03  6.2079E-03  1.2997E 02  1.1799E-03
 29   .5882   45.0    499.46  1.4314E 00  3.9439E-01  4.9952E-04  2.0171E-03  1.1987E 02  3.7940E-04
 30   .6302   45.0    502.60  1.6025E 00  4.3353E-01  5.5128E-04  2.2257E-03  1.2062E 02  4.1864E-04
 31   .6722   45.0    511.59  1.8531E 00  4.5736E-01  5.8829E-04  2.3740E-03  1.2275E 02  4.4652E-04
 32   .7170   45.0    516.44  2.5114E 00  5.9140E-01  7.6551E-04  3.0883E-03  1.2390E 02  5.8000E-04
 33   .7583   45.0    513.93  2.4536E 00  8.1366E-01  1.0500E-03  4.2360E-03  1.2330E 02  7.9690E-04
 34   .7996   45.0    516.72  3.7481E 00  1.0516E 00  1.3617E-03  5.4936E-03  1.2397E 02  1.0333E-03
 35   .8409   45.0    519.92  4.4324E 00  1.1943E 00  1.5594E-03  6.2898E-03  1.2473E 02  1.1830E-03
 36   .8822   45.0    522.04  5.0908E 00  1.3390E 00  1.7459E-03  7.0412E-03  1.2523E 02  1.3244E-03
 37   .9235   45.0    523.56  5.1261E 00  1.2837E 00  1.6771E-03  6.7631E-03  1.2559E 02  1.2721E-03
 38   .9648   45.0    531.21  4.4167E 00  1.1583E 00  1.5285E-03  6.1618E-03  1.2741E 02  1.1509E-03
 39   .2524   90.0    458.77  2.7987E 00  8.2731E-01  9.9648E-04  4.0378E-03  1.1025E 02  7.5453E-04
 40   .2943   90.0    461.50  2.6713E 00  8.5647E-01  1.0350E-03  4.1881E-03  1.1090E 02  7.8774E-04
 41   .3363   90.0    468.66  2.4432E 00  7.7115E-01  9.4083E-04  3.8023E-03  1.1259E 02  7.1517E-04
 42   .3783   90.0    473.69  2.2017E 00  6.9491E-01  8.5232E-04  3.4466E-03  1.1377E 02  6.4427E-04
 43   .4203   90.0    479.39  2.0895E 00  6.1767E-01  7.6292E-04  3.0841E-03  1.1512E 02  5.8609E-04
 44   .4623   90.0    484.26  1.7884E 00  5.5554E-01  6.9033E-04  2.7899E-03  1.1627E 02  5.2476E-04
 45   .5043   90.0    489.29  2.1744E 00  5.9912E-01  7.4917E-04  3.0269E-03  1.1746E 02  5.6933E-04
 46   .5463   90.0    493.31  2.0312E 00  5.8006E-01  7.2900E-04  2.9447E-03  1.1841E 02  5.5387E-04
 47   .5882   90.0    497.47  2.0901E 00  5.8643E-01  7.4106E-04  2.9927E-03  1.1945E 02  5.6291E-04
 48   .6302   90.0    499.94  2.1787E 00  6.5542E-01   .3063E-04  3.3540E-03  1.1999E 02  6.3086E-04
 49   .6722   90.0    509.11  3.8973E 00  7.7595E-01  9.9497E-04  4.0140E-03  1.2217E 02  7.5530E-04
 50   .7170   90.0    515.37  3.9174E 00  9.2251E-01  1.1924E-03  4.8109E-03  1.2365E 02  9.0489E-04
 51   .7583   90.0    510.81  4.4562E 00  1.1688E 00  1.4917E-03  6.0199E-03  1.2256E 02  1.1323E-03
 52   .7996   90.0    513.92  5.4973E 00  1.4843E 00  1.9160E-03  7.7260E-03  1.2330E 02  1.4532E-03
 53   .8409   90.0    516.44  6.0159E 00  1.5071E 00  1.9508E-03  7.4780E-03  1.2390E 02  1.4803E-03
 54   .8822   90.0    519.05  6.2407E 00  1.5319E 00  1.9496E-03  8.0255E-03  1.2452E 02  1.5095E-03
 55   .9235   90.0    519.88  6.6238E 00  1.4486E 00  1.8834E-03  7.5970E-03  1.2472E 02  1.4289E-03
 56   .9648   90.0    527.01  5.4217E 00  1.4000E 00  1.8373E-03  7.4079E-03  1.2641E 02  1.3934E-03
 57   .2524  135.0    453.32  9.3547E-01  2.7653E-01  3.3091E-04  1.3396E-03  1.0897E 02  2.5196E-04
 58   .2943  135.0    460.21  3.2622E 00  1.0523E 00  1.2698E-03  5.1383E-03  1.1060E 02  9.6647E-04
 59   .3363  135.0    467.41  2.9467E 00  9.3006E-01  1.1320E-03  4.5741E-03  1.1229E 02  8.6130E-04
 60   .3783  135.0    473.26  2.5987E 00  8.0726E-01  9.8960E-04  4.0018E-03  1.1367E 02  7.5278E-04
 61   .4203  135.0    479.06  2.5760E 00  7.7374E-01  9.5523E-04  3.8618E-03  1.1503E 02  7.2633E-04
 62   .4623  135.0    484.81  2.3401E 00  6.7995E-01  8.4551E-04  3.4169E-03  1.1640E 02  6.4269E-04
 63   .5043  135.0    489.55  2.5279E 00  6.4590E-01  8.0793E-04  3.2642E-03  1.1753E 02  6.1397E-04
 64   .5463  135.0    493.22  2.7494E 00  7.3024E-01  9.1764E-04  3.7067E-03  1.1839E 02  6.9720E-04
 65   .5882  135.0    497.43  3.1354E 00  8.3260E-01  1.0518E-03  4.2478E-03  1.1939E 02  7.9898E-04
 66   .6302  135.0    500.37  3.8085E 00  1.0113E 00  1.2823E-03  5.1778E-03  1.2008E 02  9.7390E-04
 67   .6722  135.0    510.10  5.4985E 00  1.3463E 00  1.7285E-03  6.9757E-03  1.2240E 02  1.3121E-03
 68   .7170  135.0    515.80  6.7939E 00  1.5949E 00  2.0694E-03  8.3487E-03  1.2377E 02  1.5703E-03
 69   .7583  135.0    [illegible]  [illegible]  1.3274E 00  [illegible]  [illegible]  1.2250E 02  [illegible]
 70   .7996  135.0    518.64  6.5747E 00  1.9103E 00  2.4734E-03  9.9743E-03  1.2395E 02  1.8768E-03
 71   .8409  135.0    519.59  6.2218E 00  1.7143E 00  2.2281E-03  8.9871E-03  1.2465E 02  1.6904E-03
 72   .8822  135.0    520.60  6.1064E 00  1.7045E 00  2.2182E-03  8.9478E-03  1.2489E 02  1.6829E-03
 73   .9235  135.0    522.98  6.4690E 00  1.5879E 00  2.0710E-03  8.3550E-03  1.2535E 02  1.5710E-03
 74   .9648  135.0    528.79  6.7509E 00  1.6254E 00  2.1380E-03  8.6197E-03  1.2683E 02  1.6213E-03
 75   .2524  180.0    463.41  3.8093E 00  1.1064E 00  1.3407E-03  5.4243E-03  1.1135E 02  1.0203E-03
 76   .2943  180.0   -116.74  6.1927E-09  1.9855E-08  1.4124E-11  5.9015E-11 -2.1036E 01  1.1100E-11
 77   .3363  180.0    476.18  2.8663E 00  8.4731E-01  1.0424E-03  4.2147E-03  1.1436E 02  7.9275E-04
 78   .3783  180.0    481.91  2.9464E 00  8.5562E-01  1.0601E-03  4.2849E-03  1.1572E 02  8.0596E-04
 79   .4203  180.0    487.46  2.9513E 00  8.7243E-01  1.0884E-03  4.3980E-03  1.1703E 02  8.2723E-04
 80   .4623  180.0    492.51  2.9643E 00  8.4651E-01  1.0628E-03  4.2933E-03  1.1823E 02  8.0753E-04
 81   .5043  180.0    497.16  2.9440E 00  7.3753E-01  9.3141E-04  3.7616E-03  1.1933E 02  7.0751E-04
 82   .5463  180.0    501.35  3.2032E 00  8.5062E-01  1.0799E-03  4.3609E-03  1.2032E 02  8.2016E-04
 83   .5882  180.0    504.99  3.4111E 00  9.0582E-01  1.1554E-03  4.6640E-03  1.2118E 02  8.7726E-04
 84   .6302  180.0    509.95  4.4048E 00  1.1697E 00  1.5016E-03  6.0593E-03  1.2236E 02  1.1397E-03
 85   .6722  180.0    519.35  8.4970E 00  1.6588E 00  2.1558E-03  8.6995E-03  1.2459E 02  1.6356E-03
 86   .7170  180.0    525.16  7.6615E 00  1.8042E 00  2.3620E-03  9.5245E-03  1.2597E 02  1.7915E-03
 87   .7583  180.0    519.97  6.3506E 00  1.5272E 00  1.9858E-03  8.0096E-03  1.2473E 02  1.5065E-03
 88   .7996  180.0    525.52  7.0122E 00  1.8267E 00  2.3925E-03  9.6475E-03  1.2606E 02  1.8146E-03
 89   .8409  180.0    527.89  7.2908E 00  1.8629E 00  2.4476E-03  9.8681E-03  1.2662E 02  1.8561E-03
 90   .8822  180.0    529.38  7.5032E 00  1.7290E 00  2.2771E-03  9.1761E-03  1.2697E 02  1.7259E-03
 91   .9235  180.0    530.55  7.7324E 00  1.7799E 00  2.3731E-03  9.5845E-03  1.2725E 02  1.7994E-03
 92   .9648  180.0    537.09  7.7707E 00  1.7907E 00  2.3015E-03  9.5949E-03  1.2881E 02  1.8051E-03
 93   .8822  225.0    532.82  6.3969E 00  1.6345E 00  2.1615E-03  8.7123E-03  1.2779E 02  1.6387E-03
 94   .9648  225.0    538.63  6.4564E 00  1.5528E 00  2.0693E-03  8.3381E-03  1.2917E 02  1.5683E-03
 95   .7170  270.0    530.49  4.6333E 00  9.9949E-01  1.3177E-03  5.3120E-03  1.2724E 02  9.9913E-04
 96   .7996  270.0    535.15  5.3516E 00  1.4211E 00  1.8851E-03  7.5974E-03  1.2835E 02  1.4290E-03
 97   .8822  270.0    538.89  5.7811E 00  1.4771E 00  1.9681E-03  7.9368E-03  1.2914E 02  1.4917E-03
 98   .9648  270.0    541.49  5.6545E 00  1.3598E 00  1.8191E-03  7.3240E-03  1.2905E 02  1.3785E-03
```

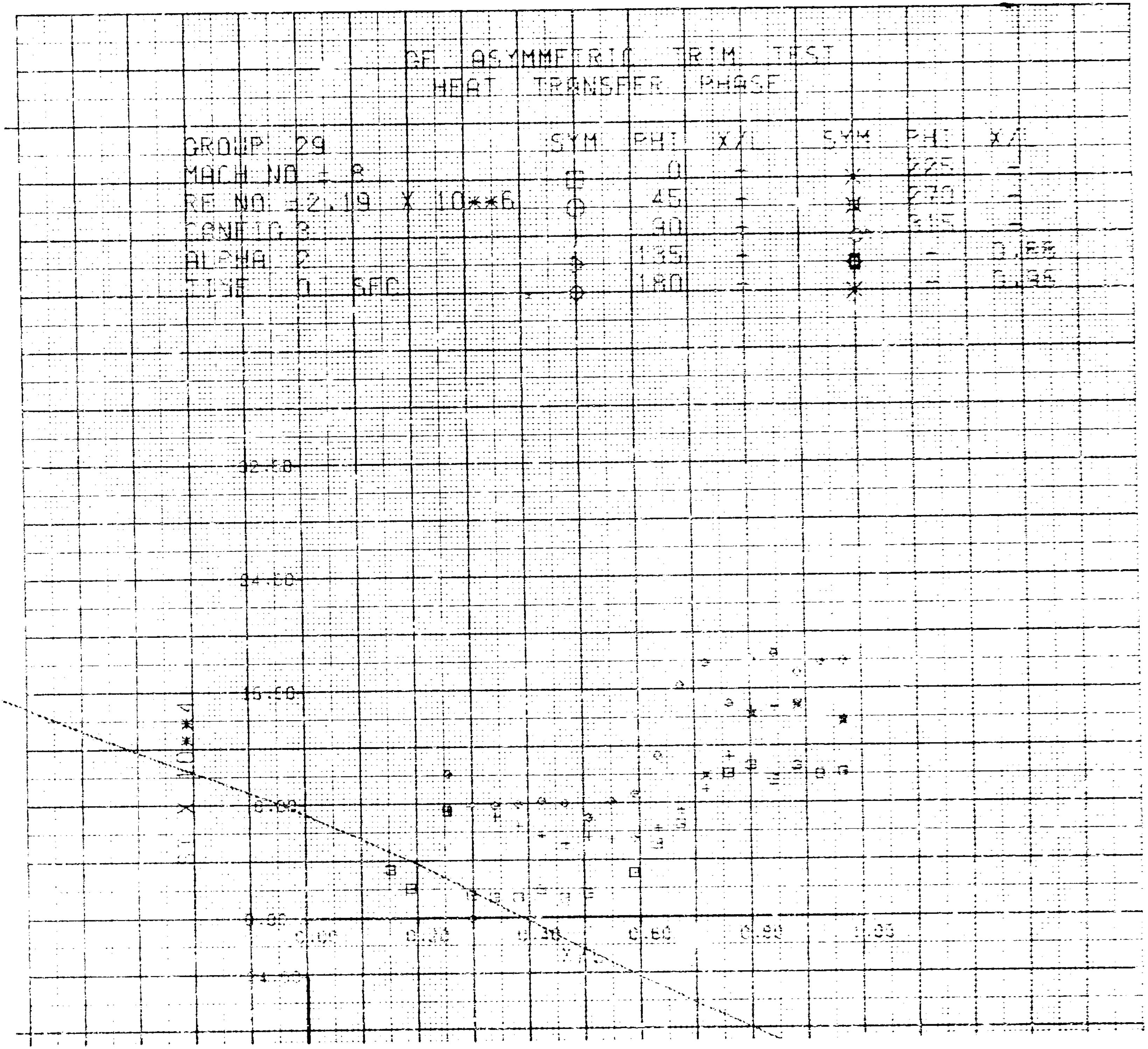
1

GE ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

GROUP 29 SYM PHI X/L SYM PHI X/L

GROUP 29 SYM PHI X/L SYM PHI X/L



2

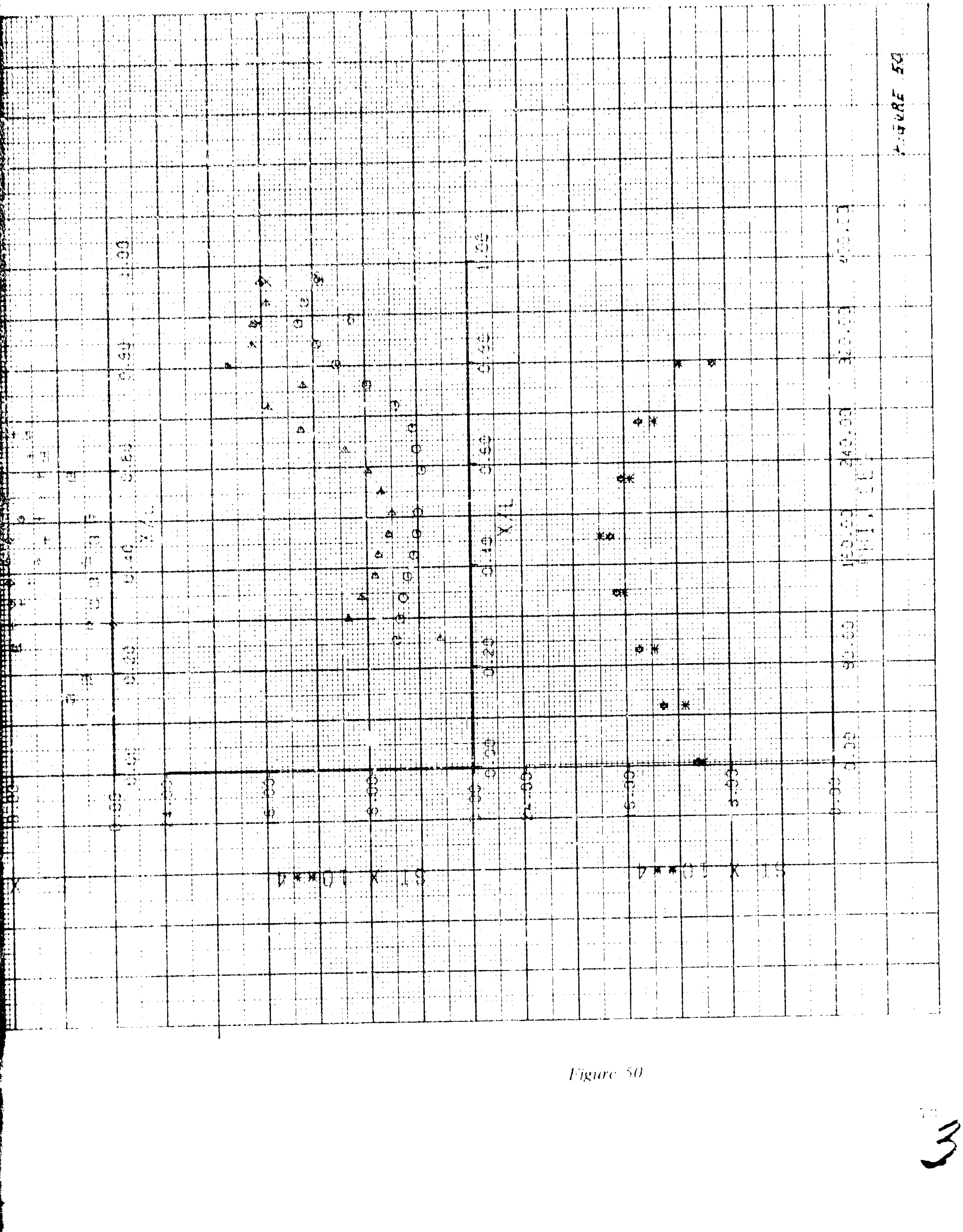


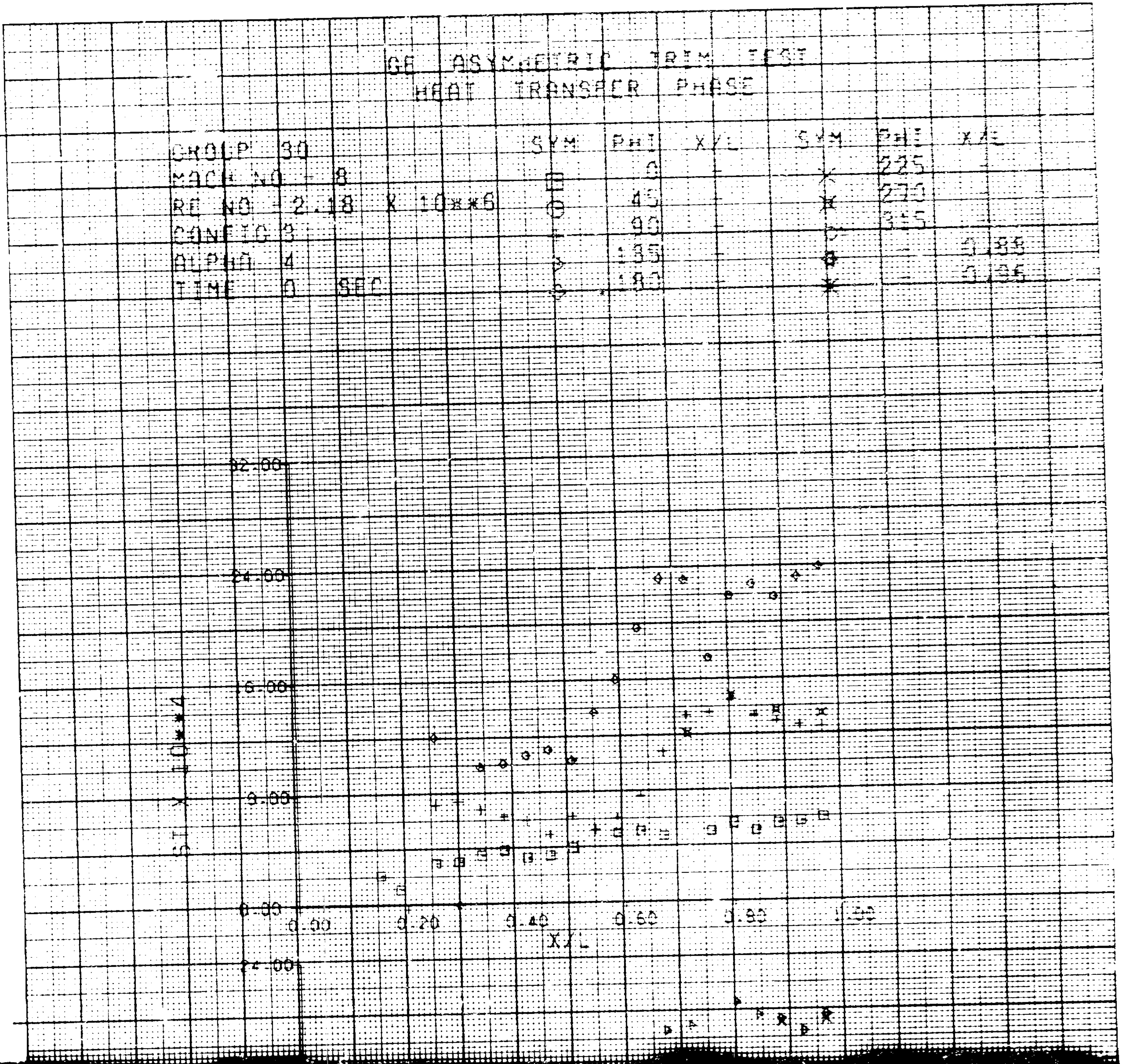
FIGURE 50
X/L
0.00
0.20
0.40
0.60
0.80
1.00
WT, LB
0.00
80.00
160.00
240.00
320.00
400.00
ST X 10**4

Figure 50

```
                                              7/16/69

                              AEDC-ARO, INC. ARNOLD AFS, TENNESSEE
                               VON KARMAN GAS DYNAMICS FACILITY
                                 50 INCH HYPERSONIC TUNNEL B
                                         VT0857-600
GROUP  CONFIG    ALPHA-M      BETA-M      ALPHA-S      ROLL   ALT-P   DATE      MACH NO      PO        TO        TIME
 36       3        4.09         0           4.09         0      0      714        7.49      470.27    1392.06     -.06
   T-INF        P-INF        Q-INF        V-INF        RHO-INF      MU-INF        RE/FT        RE/IN        HO
 9.3864?E 01  6.0942?E-02  2.17c1?E 00  3.7026E 03  6.34159E-05  7.55544E-08  2.?794?E 06  1.99051E 06  3.16106E 02

TC NO   X/L     PHI    TEMP     SLOPE         Q-STOW        HT           HM          HW           ST

  1    .1980     0    503.99  1.8491E 00   2.2690E-01   2.0777E-04   1.1016E-03   1.2088E 02   2.1726E-04
  2    .1867     0    492.18  5.6960E-01   1.2504E-01   1.5439E-04   6.3165E-04   1.1815E 02   1.1923E-04
  3    .2524     0    495.96  1.0980E 00   3.2422E-01   4.0779E-04   1.6468E-03   1.1924E 02   3.1081E-04
  4    .2943     0    511.66  1.0294E 00   3.2490E-01   4.1032E-04   1.6707E-03   1.2276E 02   3.1705E-04
  5    .3363     0    512.57  1.1701E 00   3.6932E-01   4.7380E-04   1.9115E-03   1.2298E 02   3.6081E-04
  6    .3783     0    514.95  1.3329E 00   4.0066E-01   5.1558E-04   2.0708E-03   1.2355E 02   3.9258E-04
  7    .4203     0    515.86  1.1916E 00   3.4623E-01   4.4560E-04   1.7975E-03   1.2157E 02   3.3920E-04
  8    .4623     0    517.02  1.3110E 00   3.6122E-01   4.6607E-04   1.8749E-03   1.2404E 02   3.5464E-04
  9    .5043     0    518.07  1.5272E 00   4.1310E-01   5.3382E-04   2.1510E-03   1.2424E 02   4.0640E-04
 10    .5463     0    521.17  7.2155E-02   2.0245E-02   2.6606E-05   1.0723E-04   1.2730E 02   2.0240E-05
 11    .5882     0    522.06  1.4620E 00   5.3319E-01   6.8647E-04   2.6475E-03   1.2523E 02   5.0728E-04
 12    .6302     0    524.26  1.9369E 00   5.2491E-01   6.8249E-04   2.7517E-03   1.2576E 02   5.1940E-04
 13    .6722     0    523.92  1.9490E 00   4.8824E-01   6.3566E-04   2.5630E-03   1.2560E 02   4.8370E-04
 14    .8822   315.0  541.98  2.4226E 00   7.3520E-01   9.0290E-04   3.4587E-03   1.3045E 02   7.4723E-04
 15    .7583     0    533.05  2.1361E 00   5.1320E-01   6.7619E-04   2.7249E-03   1.2785E 02   5.1434E-04
 16    .7996     0    535.33  2.0197E 00   5.6470E-01   7.4888E-04   3.0178E-03   1.2839E 02   5.6959E-04
 17    .8409     0    536.31  1.9461E 00   5.0951E-01   6.7418E-04   2.7165E-03   1.2862E 02   5.1275E-04
 18    .8822     0    539.61  2.2148E 00   5.5406E-01   7.3743E-04   2.9708E-03   1.2941E 02   5.6075E-04
 19    .9235     0    541.07  2.5607E 00   5.6860E-01   7.5709E-04   3.0497E-03   1.2975E 02   5.7565E-04
 20    .9648     0    539.86  2.6727E 00   5.9446E-01   7.9052E-04   3.1846E-03   1.2946E 02   6.0111E-04
 21    .2524    45.0  491.47  1.8582E 00   5.4931E-01   6.8616E-04   2.7714E-03   1.1798E 02   5.2111E-04
 22    .2943    45.0  503.46  1.4935E 00   4.7885E-01   6.0720E-04   2.4510E-03   1.2082E 02   4.6263E-04
 23    .3363    45.0  504.84  1.4495E 00   4.3572E-01   5.5336E-04   2.2335E-03   1.2118E 02   4.2158E-04
 24    .3783    45.0  506.30  1.2560E 00   3.7755E-01   4.8058E-04   1.9392E-03   1.2149E 02   3.6604E-04
 25    .4203    45.0  508.76  1.3478E 00   3.6256E-01   4.6286E-04   1.8678E-03   1.2207E 02   3.5255E-04
 26    .4623    45.0  512.57  1.2444E 00   3.4915E-01   4.4792E-04   1.8071E-03   1.2298E 02   3.4110E-04
 27    .5043    45.0  514.49  1.4015E 00   3.7210E-01   4.7065E-04   1.9309E-03   1.2344E 02   3.6447E-04
100    .9648   315.0  545.72  1.6618E 00   8.8640E-01   1.1812E-03   4.7568E-03   1.3110E 02   8.9786E-04
 29    .5882    45.0  518.39  1.6864E 00   4.6466E-01   6.0060E-04   2.4223E-03   1.2430E 02   4.5723E-04
 30    .6302    45.0  521.04  2.1088E 00   6.4626E-01   8.3884E-04   3.3826E-03   1.2514E 02   6.3849E-04
 31    .6722    45.0  525.14  3.5947E 00   8.8246E-01   1.1586E-03   4.6348E-03   1.2597E 02   8.7560E-04
 32    .7170    45.0  529.00  4.2780E 00   1.0074E 00   1.3202E-03   5.3218E-03   1.2688E 02   1.0045E-03
 33    .7583    45.0  532.42  1.9490E 00   1.0881E 00   1.4323E-03   5.7725E-03   1.2770E 02   1.0896E-03
 34    .7996    45.0  534.33  3.8213E 00   1.0722E 00   1.4150E-03   5.7020E-03   1.2815E 02   1.0763E-03
 35    .8409    45.0  537.29  3.8318E 00   1.0366E 00   1.3735E-03   5.5338E-03   1.2886E 02   1.0445E-03
 36    .8822    45.0  539.48  3.6554E 00   9.6146E-01   1.2776E-03   5.1467E-03   1.2938E 02   9.7147E-04
 37    .9235    45.0  541.65  1.6089E 00   9.2212E-01   1.2286E-03   4.9494E-03   1.2990E 02   9.3431E-04
 38    .9648    45.0  541.63  3.5869E 00   8.6204E-01   1.1488E-03   4.6275E-03   1.2989E 02   8.7346E-04
 39    .2524    90.0  490.30  2.4836E 00   7.6375E-01   9.5260E-04   3.8479E-03   1.1770E 02   7.2631E-04
 40    .2943    90.0  500.14  2.4380E 00   7.8100E-01   9.8705E-04   3.9850E-03   1.2003E 02   7.5218E-04
 41    .3363    90.0  502.05  2.7682E 00   7.1591E-01   9.0620E-04   3.6591E-03   1.2048E 02   6.9049E-04
 42    .3783    90.0  504.39  2.4733E 00   6.5439E-01   8.3079E-04   3.3533E-03   1.2105E 02   6.3295E-04
 43    .4203    90.0  507.07  2.1130E 00   6.2462E-01   7.9566E-04   3.2111E-03   1.21[illegible]E 02   6.0610E-04
 44    .4623    90.0  508.98  1.4728E 00   5.1964E-01   6.6359E-04   2.6778E-03   1.22[illegible]E 02   5.0544E-04
 45    .5043    90.0  511.34  2.3411E 00   6.4504E-01   8.2622E-04   3.3336E-03   1.2264E 02   6.2923E-04
 46    .5463    90.0  514.92  1.9176E 00   5.4760E-01   7.0465E-04   2.8425E-03   1.2354E 02   5.3654E-04
 47    .5882    90.0  516.39  2.2295E 00   6.2555E-01   8.0642E-04   3.2528E-03   1.2388E 02   6.1399E-04
 48    .6302    90.0  518.97  2.8556E 00   7.8680E-01   1.0177E-03   4.1040E-03   1.2450E 02   7.7476E-04
 49    .6722    90.0  523.92  4.1780E 00   1.0950E 00   1.4255E-03   5.7475E-03   1.2560E 02   1.0849E-03
 50    .7170    90.0  529.34  5.7290E 00   1.3491E 00   1.7689E-03   7.1308E-03   1.2697E 02   1.3458E-03
 51    .7583    90.0  530.24  5.2528E 00   1.3644E 00   1.7962E-03   7.2397E-03   1.2718E 02   1.3665E-03
 52    .7996    90.0  532.67  5.5817E 00   1.4540E 00   1.9148E-03   7.7170E-03   1.2776E 02   1.4565E-03
 53    .8409    90.0  534.73  5.3334E 00   1.3361E 00   1.7643E-03   7.1094E-03   1.2825E 02   1.3419E-03
 54    .8822    90.0  537.08  5.2221E 00   1.2819E 00   1.6996E-03   6.8453E-03   1.2893E 02   1.2921E-03
 55    .9235    90.0  538.91  5.3111E 00   1.2532E 00   1.6634E-03   6.7034E-03   1.2924E 02   1.2653E-03
 56    .9648    90.0  538.10  5.1500E 00   1.2305E 00   1.6426E-03   6.6180E-03   1.2905E 02   1.2492E-03
 57    .2524   135.0  483.25  8.8581E-01   2.6166E-01   3.2376E-04   1.3043E-03   1.1604E 02   2.4695E-04
 58    .2943   135.0  492.01  3.5244E 00   1.1380E 00   1.4124E-03   5.7048E-03   1.1811E 02   1.0768E-03
 59    .3363   135.0  494.15  3.1167E 00   1.0408E 00   1.3120E-03   5.2985E-03   1.1861E 02   1.0001E-03
 60    .3783   135.0  496.97  2.8375E 00   8.8143E-01   1.1085E-03   4.4742E-03   1.1927E 02   [illegible]
 61    .4203   135.0  499.74  2.9538E 00   8.8793E-01   1.1207E-03   4.5245E-03   1.1994E 02   [illegible]
 62    .4623   135.0  [illegible]  2.8221E 00   8.1994E-01   1.0391E-03   4.1945E-03   1.2070E 02   7.9[illegible]E-04
 63    .5043   135.0  506.24  3.2471E 00   8.2907E-01   1.0558E-03   4.2611E-03   1.2148E 02   8.0430E-04
 64    .5463   135.0  508.97  3.5395E 00   9.7991E-01   1.2083E-03   4.8434E-03   1.2213E 02   9.1421E-04
 65    .5882   135.0  512.70  4.4372E 00   1.1703E 00   1.5119E-03   6.0947E-03   1.2301E 02   1.1513E-03
 66    .6302   135.0  515.96  6.1083E 00   1.6221E 00   [illegible]   8.4308E-03   1.2379E 02   1.5913E-03
 67    .6722   135.0  522.82  7.9624E 00   1.9604E 00   2.[illegible]05E-03   9.9615E-03   1.2541E 02   1.8803E-03
 68    .7170   135.0  526.96  8.1759E 00   1.9253E 00   2.5165E-03   1.014[illegible]E-02   1.2640E 02   1.9149E-03
 69    .7583   135.0  525.13  5.2459E 00   1.4719E 00   1.9192E-03   7.737[illegible]E-03   1.2596E 02   1.4605E-03
 70    .7996   135.0  530.85  7.1531E 00   2.0704E 00   2.7364E-03   1.10[illegible]E-02   1.2733E 02   2.0772E-03
 71    .8409   135.0  533.46  7.1914E 00   1.9815E 00   2.6120E-03   1.0526E-02   1.2794E 02   1.9868E-03
 72    .8822   135.0  534.48  7.1841E 00   1.9436E 00   [illegible].5655E-03   1.0338E-02   1.2819E 02   1.9514E-03
 73    .9235   135.0  535.89  7.5587E 00   1.8535E 00   2.4511E-03   9.8765E-03   1.2852E 02   1.8642E-03
 74    .9648   135.0  539.35  8.1945E 00   1.9706E 00   2.6181E-03   1.0547E-02   1.2935E 02   1.9908E-03
 75    .2524   180.0  482.88  4.4334E 00   1.2882E 00   1.5920E-03   6.4392E-03   1.1595E 02   1.2143E-03
 76    .2943   180.0 -116.74 -1.1546E-14  -3.7020E-15  -2.6277E-18  -1.0978E-17  -2.1036E 01  -2.0721E-18
 77    .3363   180.0  497.12  3.5247E 00   1.0419E 00   1.3107E-03   5.2925E-03   1.1932E 02   9.9890E-04
 78    .3783   180.0  500.39  3.5088E 00   1.0547E 00   1.3323E-03   5.3787E-03   1.2009E 02   1.0153E-03
 79    .4203   180.0  503.80  3.7688E 00   1.1117E 00   1.4106E-03   5.6928E-03   1.2090E 02   1.0745E-03
 80    .4623   180.0  507.72  3.9921E 00   1.1400E 00   1.4535E-03   5.8657E-03   1.2183E 02   1.1072E-03
 81    .5043   180.0  510.68  4.2312E 00   1.0600E 00   1.3566E-03   5.4736E-03   1.2253E 02   1.0332E-03
 82    .5463   180.0  514.03  5.3050E 00   1.4087E 00   1.8107E-03   7.3045E-03   1.2333E 02   1.3788E-03
 83    .5882   180.0  517.35  6.1604E 00   1.6359E 00   2.1116E-03   8.5172E-03   1.2412E 02   1.6077E-03
 84    .6302   180.0  523.32  7.8231E 00   1.9970E 00   2.5988E-03   1.0479E-02   1.2554E 02   1.9770E-03
 85    .6722   180.0  531.86  9.8892E 00   2.3279E 00   3.0589E-03   1.2329E-02   1.2737E 02   2.3271E-03
 86    .7170   180.0  535.43  9.7869E 00   2.3047E 00   3.0460E-03   1.2274E-02   1.2841E 02   2.3168E-03
 87    .7583   180.0  532.99  7.2916E 00   1.7535E 00   2.3101E-03   9.3046E-03   1.2783E 02   1.7572E-03
 88    .7996   180.0  538.67  8.3695E 00   2.1002E 00   2.8939E-03   1.1659E-02   1.2918E 02   2.2007E-03
 89    .8409   180.0  540.42  8.4317E 00   2.2566E 00   3.0022E-03   1.2094E-02   1.2960E 02   2.2828E-03
 90    .8822   180.0  542.16  9.3655E 00   2.1582E 00   2.8780E-03   1.1593E-02   1.3002E 02   2.1882E-03
 91    .9235   180.0  543.46  9.3355E 00   2.2916E 00   3.0609E-03   1.2329E-02   1.3031E 02   2.3271E-03
 92    .9648   180.0  546.24  1.0229E 01   2.3573E 00   3.1667E-03   1.2754E-02   1.3099E 02   2.4025E-03
 93    .8822   225.0  544.06  7.4214E 00   1.8962E 00   2.5351E-03   1.0210E-02   1.3047E 02   1.9272E-03
 94    .9648   225.0  546.96  7.9279E 00   1.9065E 00   2.5587E-03   1.0309E-02   1.3116E 02   1.9449E-03
 95    .7170   270.0  538.19  5.3468E 00   1.2054E 00   1.5990E-03   6.4423E-03   1.2907E 02   1.2160E-03
 96    .7996   270.0  546.20  5.4820E 00   1.4557E 00   1.9518E-03   7.8601E-03   1.3098E 02   1.4836E-03
 97    .8822   270.0  548.88  5.7878E 00   1.3460E 00   1.8111E-03   7.2925E-03   1.3162E 02   1.3769E-03
 98    .9648   270.0  548.34  5.4834E 00   1.3187E 00   1.7731E-03   7.1396E-03   1.3149E 02   1.3476E-03
```

GE ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 30
MACH NO = 8
RE NO = 2.18 X 10**6
CONFIG 3
ALPHA 4
TIME 0 SEC
SYM PHI X/L
□ 0 —
○ 45 —
+ 90 —
▷ 135 —
◇ 180 —
SYM PHI X/L
× 225 —
⌘ 270 —
◁ 315 —
⚙ — 0.88
✳ — 0.96
32.00
24.00
16.00
8.00
0.00
-8.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

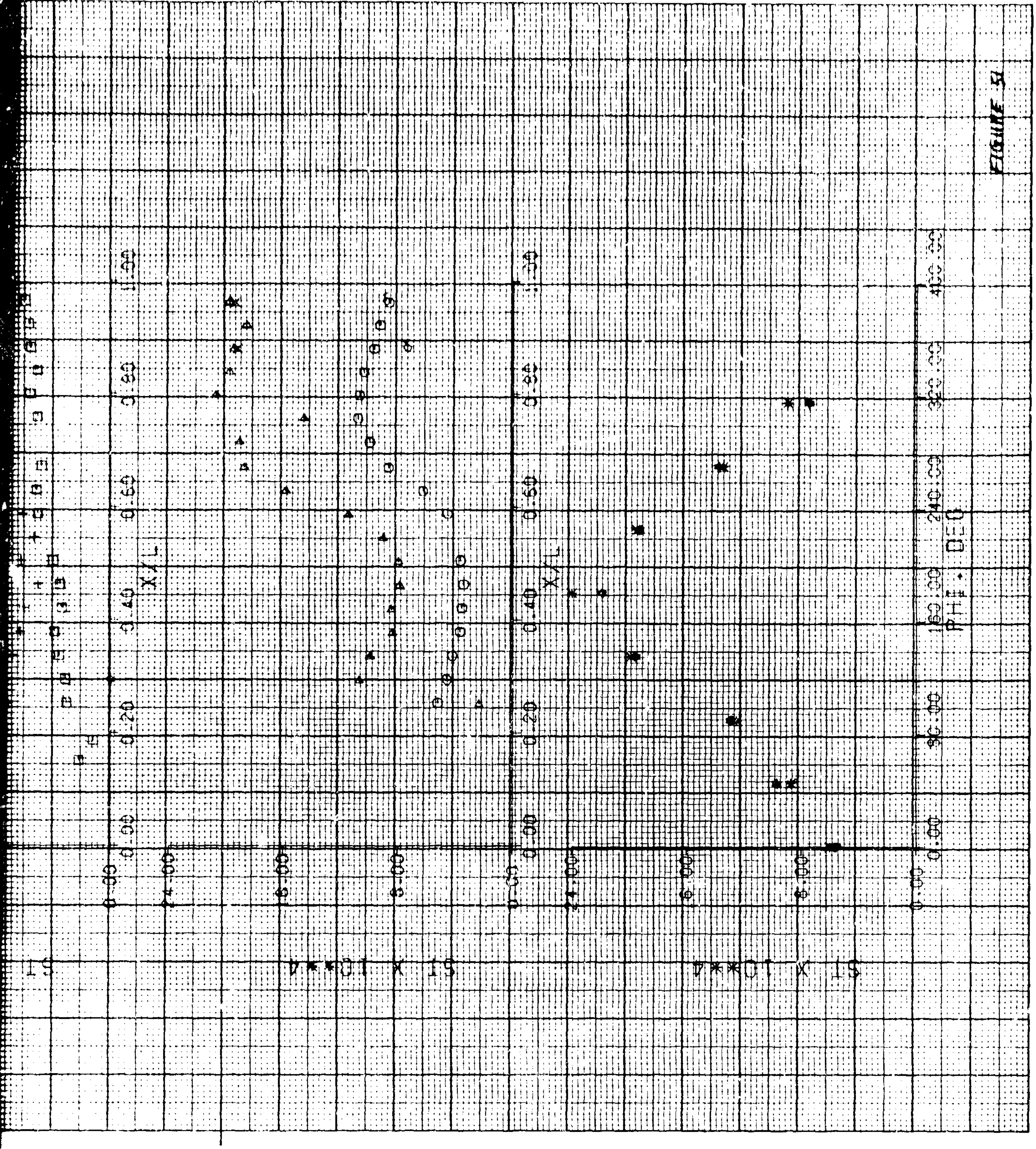


FIGURE 51
X/L
0.00
0.20
0.40
0.60
0.80
1.00
S1
S1 X 10**4
24.00
16.00
8.00
0.00
PHI, DEG
80.00
160.00
240.00
320.00
400.00

Figure 51

3

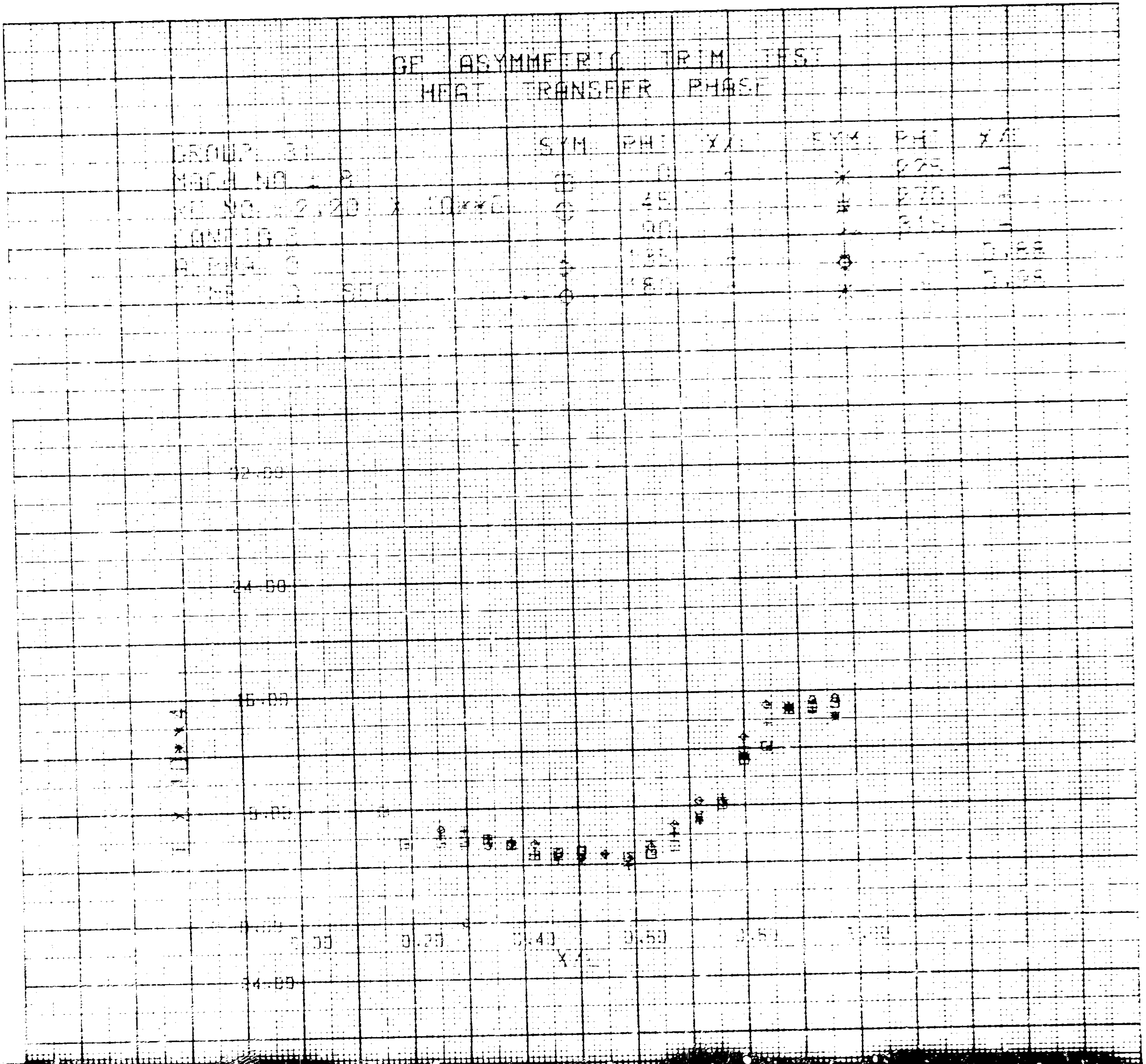
```
                                   7/14/69

                     ARO(ARO,INC.) ARNOLD AFS, TENNESSEE
                      VON KARMAN GAS DYNAMICS FACILITY
                        50 INCH HYPERSONIC TUNNEL B
                                V1094T-000
GROUP  CONFIG   ALPHA-M     BETA-M      ALPHA-S    ROLL   ALP-P   DATE     MACH NO       PO        TO        TIME
 31      7         .05         0          .05        0      0      714       7.99      470.07    1205.83      -.00
  T-INF      P-INF        Q-INF       V-INF      RHO-INF     MU-INF      RE/FT       HE/0        MU
9.8370E 01  4.0941E-02  2.1922E 00  3.7931E 03  4.3917E-05  7.5172E-08  2.1950E 06  2.0195E 06  3.1447E 02

TC NO   X/L     PHI    TEMP    SLOPE        Q-STOR       HT          HM          HW          ST

  1   .1900     0    511.18  1.7079E 00  8.0591E-01  1.0487E-03  4.2085E-03  1.2204E 02  7.9120E-04
  2   .1667     0    501.26  2.6557E 00  5.8324E-01  7.4367E-04  3.0012E-03  1.2030E 02  5.6560E-04
  3   .2524     0    505.80  1.9754E 00  5.8396E-01  7.4092E-04  3.0217E-03  1.2137E 02  5.6954E-04
  4   .2943     0    521.96  1.8240E 00  5.7571E-01  7.5397E-04  3.0419E-03  1.2541E 02  5.7207E-04
  5   .3363     0    523.58  1.8595E 00  5.8692E-01  7.7029E-04  3.1070E-03  1.2560E 02  5.8522E-04
  6   .3783     0    523.84  1.8229E 00  5.6797E-01  7.1941E-04  2.9017E-03  1.2564E 02  5.4656E-04
  7   .4203     0    523.85  1.6241E 00  4.7191E-01  6.1956E-04  2.4990E-03  1.2566E 02  4.7070E-04
  8   .4623     0    525.61  1.7012E 00  4.8528E-01  6.3868E-04  2.5755E-03  1.2608E 02  4.8512E-04
  9   .5043     0    526.21  1.8376E 00  4.9719E-01  6.5475E-04  2.6405E-03  1.2623E 02  4.9737E-04
 10   .5463     0    530.67  4.5401E-02  1.2739E-02  1.6875E-05  6.8061E-05  1.2728E 02  1.2816E-05
 11   .5882     0    530.41  1.6254E 00  4.4784E-01  5.9307E-04  2.3913E-03  1.2722E 02  4.5041E-04
 12   .6302     0    531.44  1.7127E 00  4.6330E-01  6.1448E-04  2.4774E-03  1.2747E 02  4.6664E-04
 13   .6722     0    527.95  2.0700E 00  5.1857E-01  6.8450E-04  2.7603E-03  1.2663E 02  5.1992E-04
 99   .8022   315.0  543.98  4.3076E 00  1.1221E 00  1.5132E-03  6.0969E-03  1.3045E 02  1.1486E-03
 15   .7583     0    538.15  3.2886E 00  7.9064E-01  1.0582E-03  4.2647E-03  1.2906E 02  8.0329E-04
 16   .7996     0    540.87  3.9209E 00  1.1001E 00  1.4773E-03  5.9513E-03  1.2971E 02  1.1213E-03
 17   .8409     0    541.43  4.4596E 00  1.1906E 00  1.6000E-03  6.4474E-03  1.2984E 02  1.2144E-03
 18   .8822     0    545.06  5.7257E 00  1.4344E 00  1.9372E-03  7.8044E-03  1.3071E 02  1.4700E-03
 19   .9235     0    545.86  5.7502E 00  1.4405E 00  1.9470E-03  7.8419E-03  1.3085E 02  1.4775E-03
 20   .9648     0    544.86  6.1314E 00  1.4765E 00  1.9908E-03  8.0205E-03  1.3066E 02  1.5107E-03
 21   .2524    45.0  500.27  2.3116E 00  6.8333E-01  8.7020E-04  3.5144E-03  1.2006E 02  6.6196E-04
 22   .2943    45.0  513.45  1.9325E 00  6.1960E-01  8.0250E-04  3.2387E-03  1.2319E 02  6.1003E-04
 23   .3363    45.0  515.43  1.9980E 00  6.0061E-01  7.7991E-04  3.1472E-03  1.2366E 02  5.9260E-04
 24   .3783    45.0  516.92  1.7646E 00  5.3044E-01  6.9013E-04  2.7846E-03  1.2401E 02  5.2451E-04
 25   .4203    45.0  518.25  1.6221E 00  4.7131E-01  6.1426E-04  2.4743E-03  1.2433E 02  4.6681E-04
 26   .4623    45.0  521.34  1.7370E 00  4.8736E-01  6.3775E-04  2.5727E-03  1.2506E 02  4.8458E-04
 27   .5043    45.0  522.49  1.7227E 00  4.5747E-01  5.9954E-04  2.4184E-03  1.2534E 02  4.5552E-04
100   .9648   315.0  549.33  5.6132E 00  1.3499E 00  1.8336E-03  7.1853E-03  1.3173E 02  1.3911E-03
 29   .5882    45.0  525.38  1.6552E 00  4.5605E-01  5.9995E-04  2.4197E-03  1.2602E 02  4.5576E-04
 30   .6302    45.0  527.46  1.8839E 00  5.0967E-01  6.7233E-04  2.7113E-03  1.2652E 02  5.1069E-04
 31   .6722    45.0  528.23  2.5405E 00  6.2362E-01  8.2349E-04  3.3207E-03  1.2670E 02  6.2548E-04
 32   .7170    45.0  531.50  2.0321E 00  6.9047E-01  9.1571E-04  3.6919E-03  1.2748E 02  6.9540E-04
 33   .7583    45.0  536.39  3.2956E 00  9.0803E-01  1.2120E-03  4.8854E-03  1.2863E 02  9.2019E-04
 34   .7996    45.0  539.83  4.1525E 00  1.1651E 00  1.5603E-03  6.2884E-03  1.2922E 02  1.1845E-03
 35   .8409    45.0  542.26  4.9534E 00  1.3401E 00  1.8030E-03  7.2649E-03  1.3004E 02  1.3684E-03
 36   .8822    45.0  544.34  5.3896E 00  1.4170E 00  1.9126E-03  7.7059E-03  1.3054E 02  1.4515E-03
 37   .9235    45.0  545.38  5.6407E 00  1.3902E 00  1.8782E-03  7.5668E-03  1.3078E 02  1.4253E-03
 38   .9648    45.0  545.55  5.3802E 00  1.2938E 00  1.7485E-03  7.0441E-03  1.3082E 02  1.3268E-03
 39   .2524    90.0  496.97  2.1685E 00  6.4102E-01  8.1285E-04  3.2834E-03  1.1927E 02  6.1845E-04
 40   .2943    90.0  507.24  2.0689E 00  6.6333E-01  8.5229E-04  3.4408E-03  1.2172E 02  6.4809E-04
 41   .3363    90.0  509.69  1.9988E 00  5.9930E-01  7.7246E-04  3.1181E-03  1.2230E 02  5.8732E-04
 42   .3783    90.0  511.81  1.8134E 00  5.7235E-01  7.3974E-04  2.9857E-03  1.2280E 02  5.6237E-04
 43   .4203    90.0  514.38  1.6366E 00  4.8321E-01  6.266 E-04  2.5287E-03  1.2341E 02  4.7630E-04
 44   .4623    90.0  515.22  1.4184E 00  4.6061E-01  5.7199E-04  2.3082E-03  1.2361E 02  4.3476E-04
 45   .5043    90.0  517.46  1.6168E 00  4.4549E-01  5.8001E-04  2.3403E-03  1.2414E 02  4.4080E-04
 46   .5463    90.0  520.06  1.6576E 00  4.7337E-01  6.1840E-04  2.4948E-03  1.2476E 02  4.6992E-04
 47   .5882    90.0  521.82  1.3782E 00  3.8667E-01  5.0633E-04  2.0425E-03  1.2518E 02  3.8471E-04
 48   .6302    90.0  523.46  2.0140E 00  5.5492E-01  7.2817E-04  2.9371E-03  1.2557E 02  5.5323E-04
 49   .6722    90.0  525.51  2.4480E 00  6.1126E-01  8.0429E-04  3.2438E-03  1.2606E 02  6.1099E-04
 50   .7170    90.0  530.19  2.4301E 00  6.9000E-01  9.1350E-04  3.6833E-03  1.2717E 02  6.9377E-04
 51   .7583    90.0  532.01  3.2487E 00  8.4628E-01  1.1231E-03  4.5280E-03  1.2760E 02  8.5288E-04
 52   .7996    90.0  535.27  4.5806E 00  1.1932E 00  1.5904E-03  6.4110E-03  1.2838E 02  1.2076E-03
 53   .8409    90.0  536.99  5.1968E 00  1.3520E 00  1.8062E-03  7.2799E-03  1.2878E 02  1.3712E-03
 54   .8822    90.0  539.95  5.9395E 00  1.4580E 00  1.9555E-03  7.8804E-03  1.2949E 02  1.4843E-03
 55   .9235    90.0  541.63  5.9358E 00  1.4274E 00  1.9189E-03  7.7322E-03  1.2989E 02  1.4564E-03
 56   .9644    90.0  540.68  5.7817E 00  1.3904E 00  1.8667E-03  7.5222E-03  1.2966E 02  1.4169E-03
 57   .2524   135.0  488.97  5.2548E-01  1.5534E-01  1.9500E-04  7.8801E-04  1.1738E 02  1.4843E-04
 58   .2943   135.0  495.01  2.0860E 00  6.6880E-01  8.4603E-04  3.4178E-03  1.1882E 02  6.4376E-04
 59   .3363   135.0  498.36  1.9758E 00  6.2361E-01  7.9222E-04  3.1998E-03  1.1961E 02  6.0271E-04
 60   .3783   135.0  500.97  1.8707E 00  5.8110E-01  7.4067E-04  2.9912E-03  1.2023E 02  5.6341E-04
 61   .4203   135.0  503.99  1.6048E 00  5.4253E-01  6.9618E-04  2.8630E-03  1.2095E 02  5.2796E-04
 62   .4623   135.0  507.12  1.7664E 00  5.1323E-01  6.5933E-04  2.6618E-03  1.2169E 02  5.0137E-04
 63   .5043   135.0  510.04  1.7448E 00  4.4582E-01  5.7490E-04  2.3206E-03  1.2238E 02  4.3709E-04
 64   .5463   135.0  512.26  1.7550E 00  4.6605E-01  6.0270E-04  2.4325E-03  1.2291E 02  4.5818E-04
 65   .5882   135.0  514.39  1.9148E 00  4.8191E-01  6.2493E-04  2.5219E-03  1.2341E 02  4.7502E-04
 66   .6302   135.0  517.05  2.1450E 00  5.6961E-01  7.4122E-04  2.9908E-03  1.2404E 02  5.6333E-04
 67   .6722   135.0  521.39  2.6937E 00  6.4778E-01  8.4772E-04  3.4197E-03  1.2508E 02  6.4413E-04
 68   .7170   135.0  524.64  3.0444E 00  7.1693E-01  9.4223E-04  3.8003E-03  1.2585E 02  7.1581E-04
 69   .7583   135.0  525.71  2.5529E 00  7.1629E-01  9.4271E-04  3.8020E-03  1.2610E 02  7.1613E-04
 70   .7996   135.0  529.58  4.6177E 00  1.3417E 00  1.7749E-03  7.1567E-03  1.2702E 02  1.3480E-03
 71   .8409   135.0  532.45  5.1505E 00  1.4191E 00  1.8844E-03  7.5971E-03  1.2771E 02  1.4310E-03
 72   .8822   135.0  533.87  5.6348E 00  1.5245E 00  2.0281E-03  8.1758E-03  1.2804E 02  1.5400E-03
 73   .9235   135.0  536.00  5.7333E 00  1.4074E 00  1.8777E-03  7.5685E-03  1.2855E 02  1.4256E-03
 74   .9648   135.0  538.73  6.0622E 00  1.4578E 00  1.9521E-03  7.8673E-03  1.2920E 02  1.4819E-03
 75   .2524   180.0  490.26  2.3562E 00  6.8461E-01  8.6085E-04  3.4786E-03  1.1769E 02  6.5521E-04
 76   .2943   180.0 -116.76 -1.1546E-14 -3.7020E-15 -2.6400E-18 -1.1033E-17 -2.1036E 01 -2.0782E-18
 77   .3363   180.0  500.26  1.8835E 00  5.5679E-01  7.0905E-04  2.8636E-03  1.2006E 02  5.3938E-04
 78   .3783   180.0  503.23  1.8984E 00  5.7065E-01  7.2945E-04  2.9455E-03  1.2077E 02  5.5481E-04
 79   .4203   180.0  506.70  1.9052E 00  5.6320E-01  7.2314E-04  2.9195E-03  1.2159E 02  5.4490E-04
 80   .4623   180.0  510.84  1.7191E 00  4.9093E-01  6.3371E-04  2.5579E-03  1.2257E 02  4.8179E-04
 81   .5043   180.0  513.60  1.8228E 00  4.5665E-01  5.9157E-04  2.3874E-03  1.2323E 02  4.4968E-04
 82   .5463   180.0  515.97  1.7975E 00  4.7732E-01  6.2026E-04  2.5029E-03  1.2379E 02  4.714 E-04
 83   .5882   180.0  518.12  1.6961E 00  4.5041E-01  5.8692E-04  2.3681E-03  1.2430E 02  4.4604E-04
 84   .6302   180.0  522.22  1.9548E 00  5.1911E-01  6.8008E-04  2.7433E-03  1.2527E 02  5.1672E-04
 85   .6722   180.0  527.27  2.8012E 00  6.7362E-01  8.8832E-04  3.5823E-03  1.2646E 02  6.7476E-04
 86   .7170   180.0  531.09  3.5124E 00  8.2713E-01  1.0964E-03  4.4204E-03  1.2738E 02  8.3261E-04
 87   .7583   180.0  532.08  3.3951E 00  8.1644E-01  1.0836E-03  4.3687E-03  1.2762E 02  8.2288E-04
 88   .7996   180.0  535.80  4.8611E 00  1.2663E 00  1.6890E-03  6.8083E-03  1.2850E 02  1.2824E-03
 89   .8409   180.0  537.99  5.8073E 00  1.4838E 00  1.9849E-03  8.0000E-03  1.2902E 02  1.5069E-03
 90   .8822   180.0  539.91  6.3116E 00  1.4564E 00  1.9506E-03  7.8610E-03  1.2948E 02  1.4807E-03
 91   .9235   180.0  542.11  6.1730E 00  1.5030E 00  2.0219E-03  8.1472E-03  1.3002E 02  1.5346E-03
 92   .9648   180.0  545.47  6.5341E 00  1.5057E 00  2.0346E-03  8.1968E-03  1.3080E 02  1.5439E-03
 93   .8822   225.0  542.04  5.6768E 00  1.4505E 00  1.9509E-03  7.8610E-03  1.2999E 02  1.4807E-03
 94   .9648   225.0  546.72  5.7403E 00  1.3804E 00  1.8684E-03  7.5269E-03  1.3110E 02  1.4177E-03
 95   .7170   270.0  537.08  3.1713E 00  7.1498E-01  9.5528E-04  3.8503E-03  1.2881E 02  7.2524E-04
 96   .7956   270.0  544.83  4.2293E 00  1.1231E 00  1.5163E-03  6.1049E-03  1.3065E 02  1.1507E-03
 97   .8822   270.0  548.08  5.6377E 00  1.4465E 00  1.9533E-03  7.8684E-03  1.3143E 02  1.4821E-03
 98   .9648   270.0  548.91  5.4860E 00  1.3674E 00  1.8563E-03  7.4772E-03  1.3163E 02  1.4084E-03
```

GE ASYMMETRIC TRIM 115

HEAT TRANSFER PHASE

SYM. PH X1 SYM PH X

GROUP 31


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 31
MACH NO 8
RE NO 2.20 X 10**6
CONFIG 3
ALPHA 0
TIME 3 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.94
32.00
24.00
16.00
8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

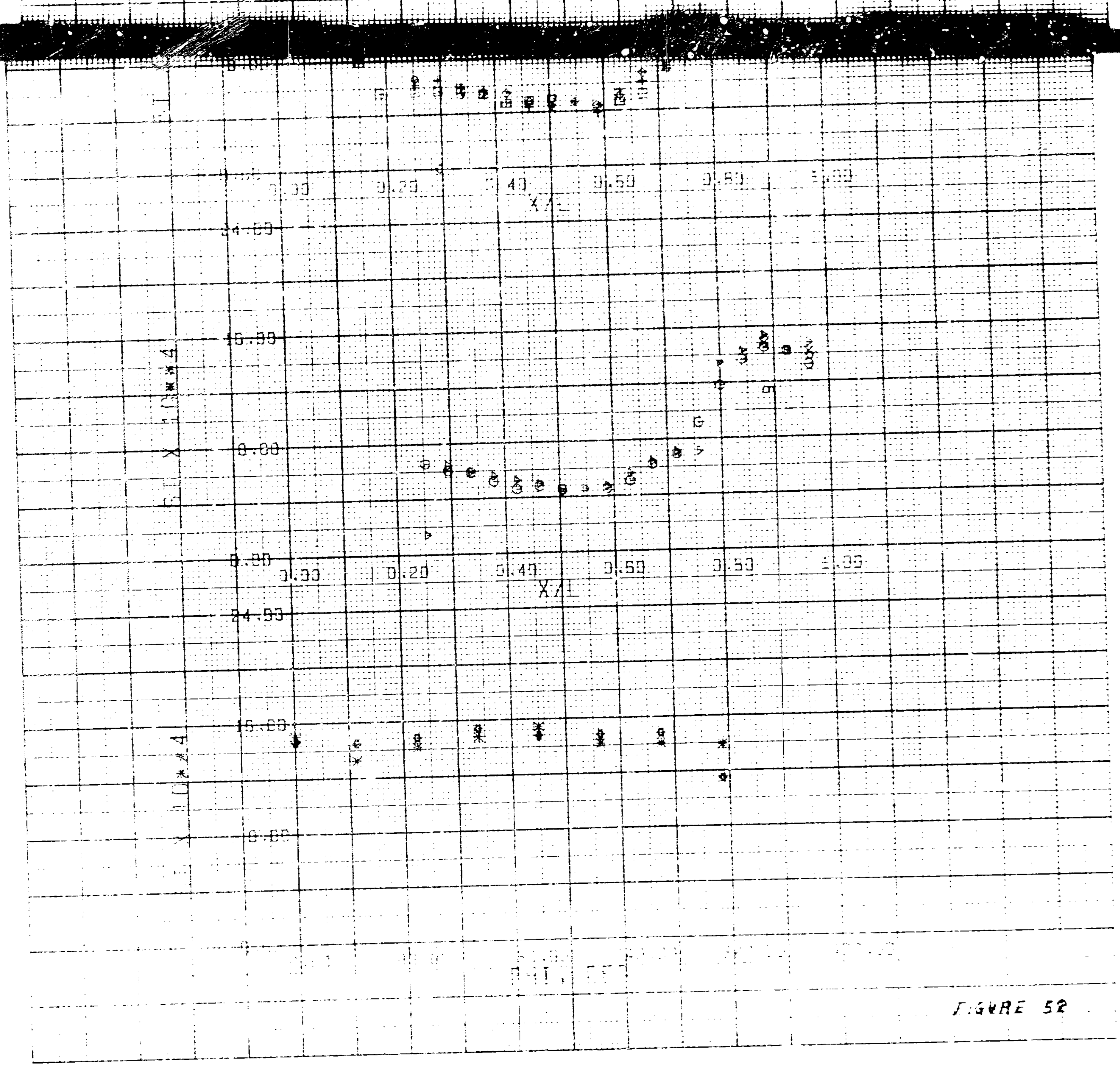

0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
8.00
0.00
X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
8.00
0.00
X 10**4

FIGURE 52

7/14/69

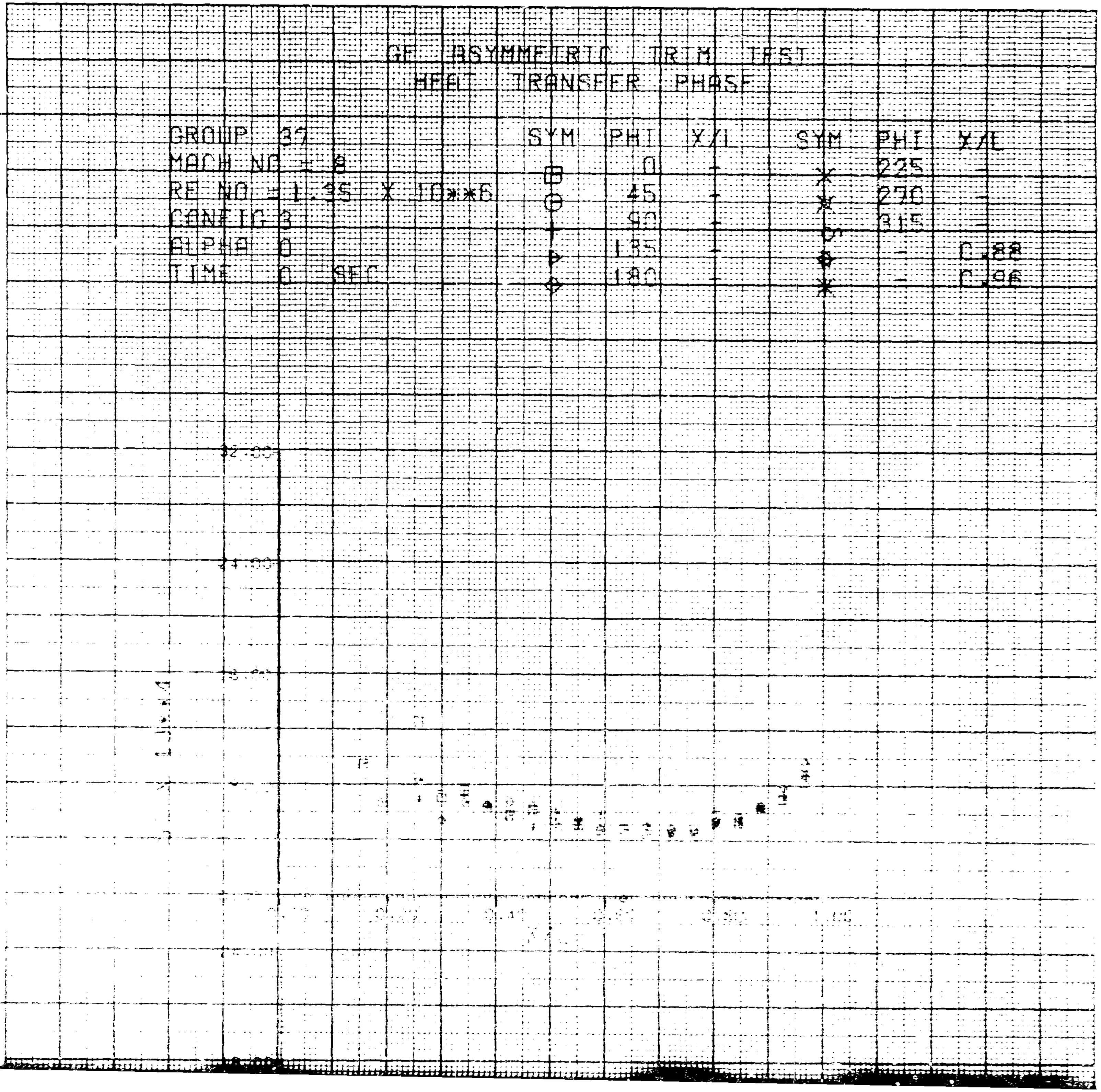
ARO, INC. - ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT09A7-800

[illegible]	[illegible]	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
17	3	.01	0	.01	0	0	715	7.97	281.60	1270.00	-.00

[illegible]	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.20[illegible] 01	2.95647E-02	1.31454E 00	3.75906E 03	2.67659E-05	7.46109E-08	1.36406E 06	1.23631E 06	3.10495E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STUW	HT	HM	HS	ST
1	.0500	0	516.56	2.5280E 00	5.7083E-01	7.7828E-04	3.1397E-03	1.2868E 02	9.6976E-04
2	.1667	0	511.55	1.4648E 00	4.0597E-01	5.5133E-04	2.2265E-03	1.2799E 02	6.8766E-04
3	.2524	0	513.60	2.5442E 00	7.5230E-01	1.0216E-03	4.1217E-03	1.2803E 02	1.2731E-03
4	.2943	0	517.01	1.3660E 00	4.2509E-01	5.8056E-04	2.3419E-03	1.2898E 02	7.2334E-04
5	.3363	0	540.11	1.4422E 00	4.5519E-01	6.2363E-04	2.5153E-03	1.2953E 02	7.7697E-04
6	.3783	0	541.36	1.1665E 00	3.8070E-01	5.2247E-04	2.1071E-03	1.2982E 02	6.5003E-04
7	.4203	0	541.55	1.2039E 00	3.4980E-01	4.8019E-04	1.9360E-03	1.2987E 02	5.9817E-04
8	.4623	0	542.44	1.1489E 00	3.7166E-01	5.1093E-04	2.0601E-03	1.3008E 02	6.3630E-04
9	.5043	0	542.48	1.1151E 00	3.5584E-01	4.8910E-04	1.9720E-03	1.3009E 02	6.0924E-04
10	.5463	0	544.17	1.1143E 00	3.1266E-01	4.3075E-04	1.7370E-03	1.3049E 02	5.3650E-04
11	.5882	0	544.96	1.0380E 00	2.8621E-01	3.9475E-04	1.5917E-03	1.3068E 02	4.9164E-04
12	.6302	0	545.49	1.0881E 00	2.9437E-01	4.0629E-04	1.6382E-03	1.3081E 02	5.0600E-04
13	.6722	0	546.81	1.0627E 00	2.7124E-01	3.7404E-04	1.5042E-03	1.3065E 02	4.6585E-04
14	[illegible]	315.0	556.33	1.4831E 00	3.8641E-01	5.4143E-04	2.1818E-03	1.3339E 02	6.7391E-04
15	.7563	0	549.51	1.1111E 00	2.9125E-01	4.0430E-04	1.6290E-03	1.3179E 02	5.0340E-04
16	.7996	0	551.77	1.1159E 00	3.1393E-01	4.3708E-04	1.7619E-03	1.3231E 02	5.4416E-04
17	.8409	0	552.64	1.1402E 00	3.1688E-01	4.4173E-04	1.7804E-03	1.3251E 02	5.4992E-04
18	.8822	0	553.16	1.4901E 00	3.7481E-01	5.2282E-04	2.1072E-03	1.3262E 02	6.5085E-04
19	.9235	0	552.85	1.6597E 00	4.1578E-01	5.7960E-04	2.3361E-03	1.3252E 02	7.2156E-04
20	.9648	0	551.27	2.0180E 00	4.8543E-01	6.7540E-04	2.7224E-03	1.3219E 02	8.4088E-04
21	.2524	45.0	532.37	1.6338E 00	4.8298E-01	6.5476E-04	2.6420E-03	1.2769E 02	8.1603E-04
22	.2943	45.0	536.61	1.4081E 00	4.5145E-01	6.1556E-04	2.4812E-03	1.2870E 02	7.6700E-04
23	.3363	45.0	539.24	1.4521E 00	4.3652E-01	5.9734E-04	2.4094E-03	1.2932E 02	7.4419E-04
24	.3783	45.0	540.39	1.2324E 00	3.7047E-01	5.0776E-04	2.0479E-03	1.2959E 02	6.3255E-04
25	.4203	45.0	542.28	1.1791E 00	3.4261E-01	4.7074E-04	1.8984E-03	1.3003E 02	5.8638E-04
26	.4623	45.0	544.48	1.2111E 00	3.3900E-01	4.6835E-04	1.8880E-03	1.3057E 02	5.8333E-04
27	.5043	45.0	545.27	1.2460E 00	3.3034E-01	4.5581E-04	1.8379E-03	1.3076E 02	5.6768E-04
100	.9648	315.0	555.25	2.0242E 00	4.8774E-01	6.8218E-04	2.7500E-03	1.3313E 02	8.4939E-04
29	.5882	45.0	546.99	1.1125E 00	3.0653E-01	4.2397E-04	1.7093E-03	1.3117E 02	5.2797E-04
30	.6302	45.0	547.66	1.1179E 00	3.0243E-01	4.1868E-04	1.6880E-03	1.3133E 02	5.2137E-04
31	.6722	45.0	547.79	1.1639E 00	2.8570E-01	3.9554E-04	1.5949E-03	1.3136E 02	4.9263E-04
32	.7170	45.0	549.36	1.1099E 00	2.6138E-01	3.6270E-04	1.4621E-03	1.3173E 02	4.5162E-04
33	.7563	45.0	552.20	1.1829E 00	3.2593E-01	4.5407E-04	1.8302E-03	1.3241E 02	5.6530E-04
34	.7996	45.0	554.21	1.1461E 00	3.2158E-01	4.4927E-04	1.8100E-03	1.3289E 02	5.5926E-04
35	.8409	45.0	555.80	1.3881E 00	3.7499E-01	5.2512E-04	2.1161E-03	1.3329E 02	6.5362E-04
36	.8822	45.0	556.44	1.4958E 00	3.9344E-01	5.5137E-04	2.2219E-03	1.3342E 02	6.8628E-04
37	.9235	45.0	556.27	1.6892E 00	4.2651E-01	5.9753E-04	2.4079E-03	1.3337E 02	7.4374E-04
38	.9648	45.0	555.09	1.9571E 00	4.7065E-01	6.5832E-04	2.6530E-03	1.3310E 02	8.1946E-04
39	.2524	90.0	535.58	1.4217E 00	4.2026E-01	5.7223E-04	2.3085E-03	1.2845E 02	7.1304E-04
40	.2943	90.0	540.08	1.4213E 00	4.5570E-01	6.2431E-04	2.5180E-03	1.2952E 02	7.7776E-04
41	.3363	90.0	542.18	1.3918E 00	4.3930E-01	6.0358E-04	2.4342E-03	1.3002E 02	7.5185E-04
42	.3783	90.0	543.89	1.2173E 00	3.8421E-01	5.2914E-04	2.1337E-03	1.3043E 02	6.5905E-04
43	.4203	90.0	545.27	1.3117E 00	3.5818E-01	4.9423E-04	1.9928E-03	1.3076E 02	6.1553E-04
44	.4623	90.0	545.07	9.4364E-01	2.9935E-01	4.1293E-04	1.6650E-03	1.3071E 02	5.1428E-04
	.5043	90.0	546.17	1.3114E 00	3.6133E-01	4.9919E-04	2.0127E-03	1.3097E 02	6.2168E-04
46	.5463	90.0	547.74	1.0844E 00	3.0967E-01	4.2878E-04	1.7287E-03	1.3136E 02	5.3394E-04
47	.5882	90.0	548.14	1.2455E 00	3.4944E-01	4.8413E-04	1.9518E-03	1.3144E 02	6.0285E-04
48	.6302	90.0	547.95	1.1258E 00	3.1018E-01	4.2958E-04	1.7319E-03	1.3139E 02	5.3490E-04
49	.6722	90.0	547.47	1.2425E 00	3.1127E-01	4.3080E-04	1.7368E-03	1.3128E 02	5.3647E-04
50	.7170	90.0	549.31	1.1618E 00	2.7359E-01	3.7962E-04	1.5303E-03	1.3172E 02	4.7268E-04
51	.7563	90.0	550.63	1.1126E 00	2.6378E-01	3.6668E-04	1.4781E-03	1.3203E 02	4.5654E-04
52	.7996	90.0	552.43	1.3909E 00	3.6234E-01	5.0495E-04	2.0352E-03	1.3246E 02	6.2863E-04
53	.8409	90.0	553.01	1.2847E 00	3.2185E-01	4.4889E-04	1.8092E-03	1.3260E 02	5.5883E-04
54	.8822	90.0	553.84	1.5277E 00	3.7501E-01	5.2363E-04	2.1103E-03	1.3280E 02	6.5184E-04
55	.9235	90.0	552.71	1.7918E 00	4.3090E-01	6.0073E-04	2.4213E-03	1.3253E 02	7.4786E-04
56	.9648	90.0	550.86	2.1467E 00	5.1625E-01	7.1787E-04	2.8937E-03	1.3209E 02	8.9378E-04
57	.2524	135.0	531.77	2.4755E-01	7.9092E-02	1.0714E-04	4.3231E-04	1.2756E 02	1.3353E-04
58	.2943	135.0	535.17	1.4941E 00	4.7903E-01	6.5189E-04	2.6300E-03	1.2835E 02	8.1233E-04
59	.3363	135.0	536.72	1.3871E 00	4.3781E-01	5.9705E-04	2.4085E-03	1.2872E 02	7.4393E-04
60	.3783	135.0	535.19	1.3385E 00	4.1574E-01	5.6583E-04	2.2828E-03	1.2836E 02	7.0509E-04
61	.4203	135.0	538.31	1.2931E 00	3.8870E-01	5.3123E-04	2.1428E-03	1.2910E 02	6.6186E-04
62	.4623	135.0	539.14	1.2588E 00	3.6577E-01	5.0046E-04	2.0186E-03	1.2930E 02	6.2349E-04
63	.5043	135.0	540.03	1.2987E 00	3.3183E-01	4.5458E-04	1.8335E-03	1.2951E 02	5.6631E-04
64	.5463	135.0	540.63	1.2219E 00	3.2447E-01	4.4485E-04	1.7942E-03	1.2965E 02	5.5418E-04
65	.5882	135.0	541.18	1.0734E 00	2.8504E-01	3.9110E-04	1.5773E-03	1.2978E 02	4.8720E-04
66	.6302	135.0	541.56	1.2444E 00	3.3044E-01	4.5362E-04	1.8294E-03	1.2987E 02	5.6506E-04
67	.6722	135.0	542.89	1.2701E 00	3.0545E-01	4.1996E-04	1.6936E-03	1.3014E 02	5.2311E-04
68	.7170	135.0	543.43	1.1436E 00	2.6931E-01	3.7066E-04	1.4947E-03	1.3032E 02	4.6168E-04
69	.7563	135.0	544.44	9.3173E-01	2.6142E-01	3.6030E-04	1.4529E-03	1.3056E 02	4.4875E-04
70	.7996	135.0	546.86	1.2948E 00	3.7622E-01	5.2025E-04	2.0976E-03	1.3113E 02	6.4788E-04
71	.8409	135.0	547.70	1.5707E 00	4.3277E-01	5.9915E-04	2.4155E-03	1.3134E 02	7.4610E-04
72	.8822	135.0	547.65	1.8823E 00	4.2807E-01	5.9260E-04	2.3892E-03	1.3132E 02	7.3795E-04
73	.9235	135.0	547.63	1.8936E 00	4.6482E-01	6.4346E-04	2.5942E-03	1.3132E 02	8.0128E-04
74	.9648	135.0	549.30	2.2579E 00	5.4299E-01	7.5350E-04	3.0375E-03	1.3174E 02	9.3822E-04
75	.2524	180.0	531.96	1.7296E 00	5.0256E-01	6.8092E-04	2.7476E-03	1.2758E 02	8.6065E-04
76	.2943	180.0	537.13	1.0389E 00	3.3309E-01	4.5450E-04	1.8334E-03	1.2882E 02	5.6630E-04
77	.3363	180.0	539.55	1.1685E 00	4.0454E-01	5.5392E-04	2.2318E-03	1.2939E 02	6.8996E-04
78	.3783	180.0	540.63	1.3087E 00	3.9330E-01	5.3934E-04	2.1753E-03	1.2965E 02	6.7188E-04
79	.4203	180.0	542.01	1.3793E 00	4.0773E-01	5.6007E-04	2.2587E-03	1.2998E 02	6.9765E-04
80	.4623	180.0	542.77	1.3036E 00	3.8941E-01	5.3547E-04	2.1594E-03	1.3016E 02	6.6698E-04
81	.5043	180.0	543.97	1.2565E 00	3.1477E-01	4.3354E-04	1.7482E-03	1.3045E 02	5.3999E-04
82	.5463	180.0	545.10	1.2557E 00	3.3344E-01	4.5998E-04	1.8547E-03	1.3072E 02	5.7288E-04
83	.5882	180.0	545.95	1.1074E 00	2.9407E-01	4.0615E-04	1.6376E-03	1.3092E 02	5.0581E-04
84	.6302	180.0	538.61	-4.9499E-03	-1.8456E-03	-2.5233E-06	-1.0178E-05	1.2917E 02	-3.1438E-06
85	.6722	180.0	548.36	1.2814E 00	3.0335E-01	[illegible]	1.8947E-03	1.3149E 02	5.2346E-04
86	.7170	180.0	549.24	1.2505E 00	2.9447E-01	4.0854E-04	1.6471E-03	1.3171E 02	5.0875E-04
87	.7563	180.0	550.27	1.1923E 00	2.8672E-01	3.9837E-04	1.6058E-03	1.3195E 02	4.9600E-04
88	.7996	180.0	552.09	1.2371E 00	3.2227E-01	4.4890E-04	1.8094E-03	1.3238E 02	5.5886E-04
89	.8409	180.0	552.34	1.1174E 00	3.3660E-01	4.6903E-04	1.8905E-03	1.3244E 02	5.8391E-04
90	.8822	180.0	552.48	1.4932E 00	3.9018E-01	5.4379E-04	2.1918E-03	1.3248E 02	6.7698E-04
91	.9235	180.0	553.38	1.8883E 00	4.5861E-01	6.3991E-04	2.5792E-03	1.3268E 02	7.9664E-04
92	.9648	180.0	554.32	2.4509E 00	5.6477E-01	7.8912E-04	3.1803E-03	1.3291E 02	9.8231E-04
93	.8822	225.0	555.13	1.4120E 00	4.1208E-01	5.7644E-04	2.3211E-03	1.3311E 02	7.1753E-04
94	.9648	225.0	555.30	2.3808E 00	5.4844E-01	7.6742E-04	3.0927E-03	1.3315E 02	9.5524E-04
95	.7170	270.0	553.54	1.1822E 00	2.6652E-01	3.7199E-04	1.4992E-03	1.3273E 02	4.6308E-04
96	.7996	270.0	559.64	1.1693E 00	3.1052E-01	4.3715E-04	1.7613E-03	1.3419E 02	5.4407E-04
97	.8822	270.0	560.98	1.4571E 00	3.7229E-01	5.2507E-04	2.1152E-03	1.3448E 02	6.5332E-04
98	.9648	270.0	557.54	2.1600E 00	5.1944E-01	7.2910E-04	2.9379E-03	1.3369E 02	9.0743E-04

GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PHI X/L SYM PHI X/L
GROUP 39


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 37
MACH NO = 8
RE NO = 1.35 X 10**6
CONFIG 3
ALPHA 0
TIME 0 SEC
SYM PHI X/L
⊞ 0 -
⊖ 45 -
+ 90 -
▷ 135 -
◇ 180 -
SYM PHI X/L
× 225 -
✻ 270 -
♂ 315 -
✲ - 0.88
✳ - 0.96
32.00
24.00
0.20
0.40
0.60
0.80
1.00
X/L

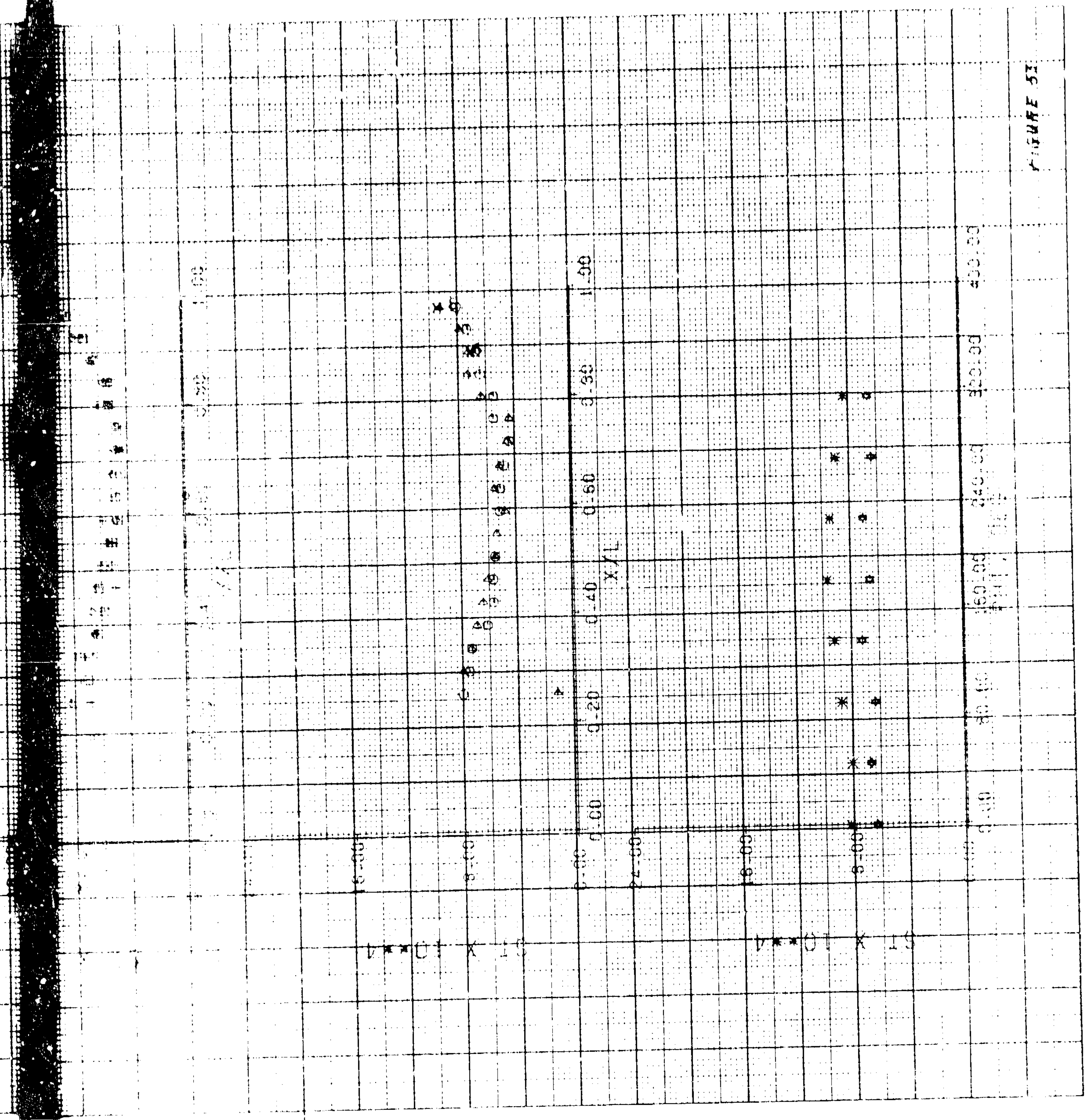
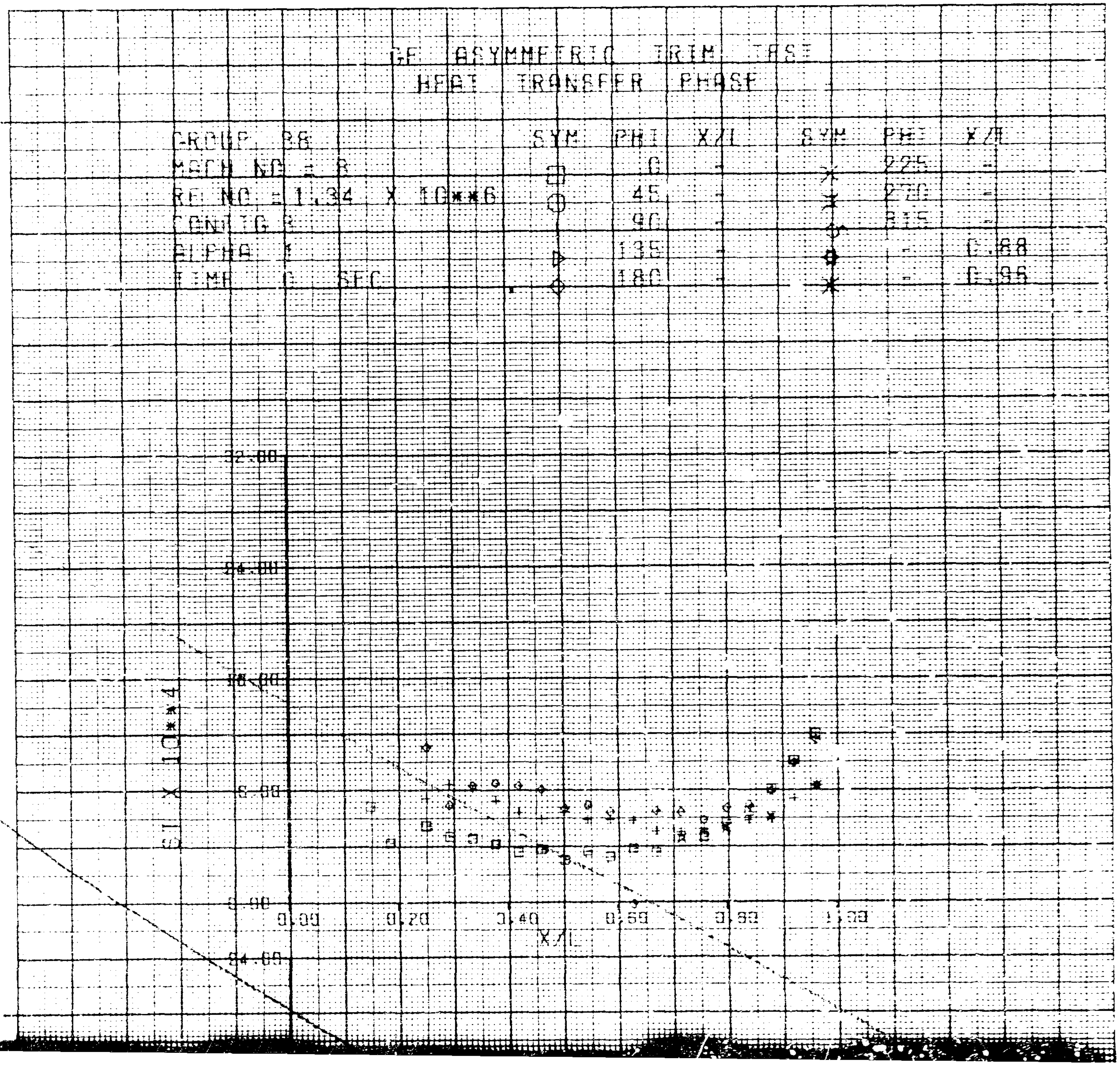


FIGURE 53
X/L
0.00
0.20
0.40
0.60
0.80
1.00
0.00
80.00
160.00
240.00
320.00
400.00
8.00
4.00
0.00

Figure 53

3


GE ASYMMETRIC TRIM CASE
HEAT TRANSFER PHASE
GROUP 86
MACH NO = 8
RE NO = 1.34 X 10**6
CONFIG 3
ALPHA
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/R
225 -
270 -
315 -
- 0.88
- 0.95
32.00
24.00
16.00
8.00
0.00
-8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

2

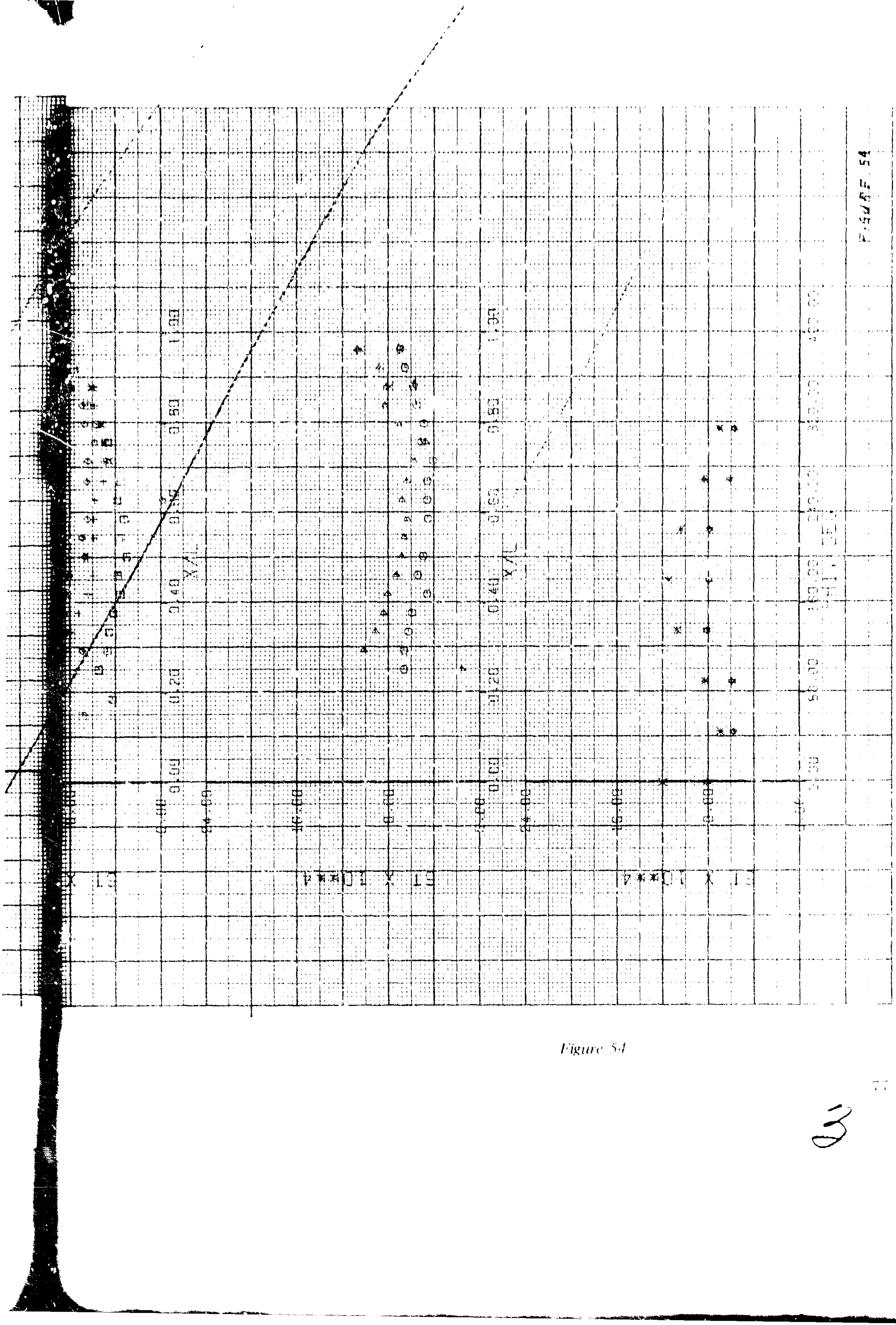


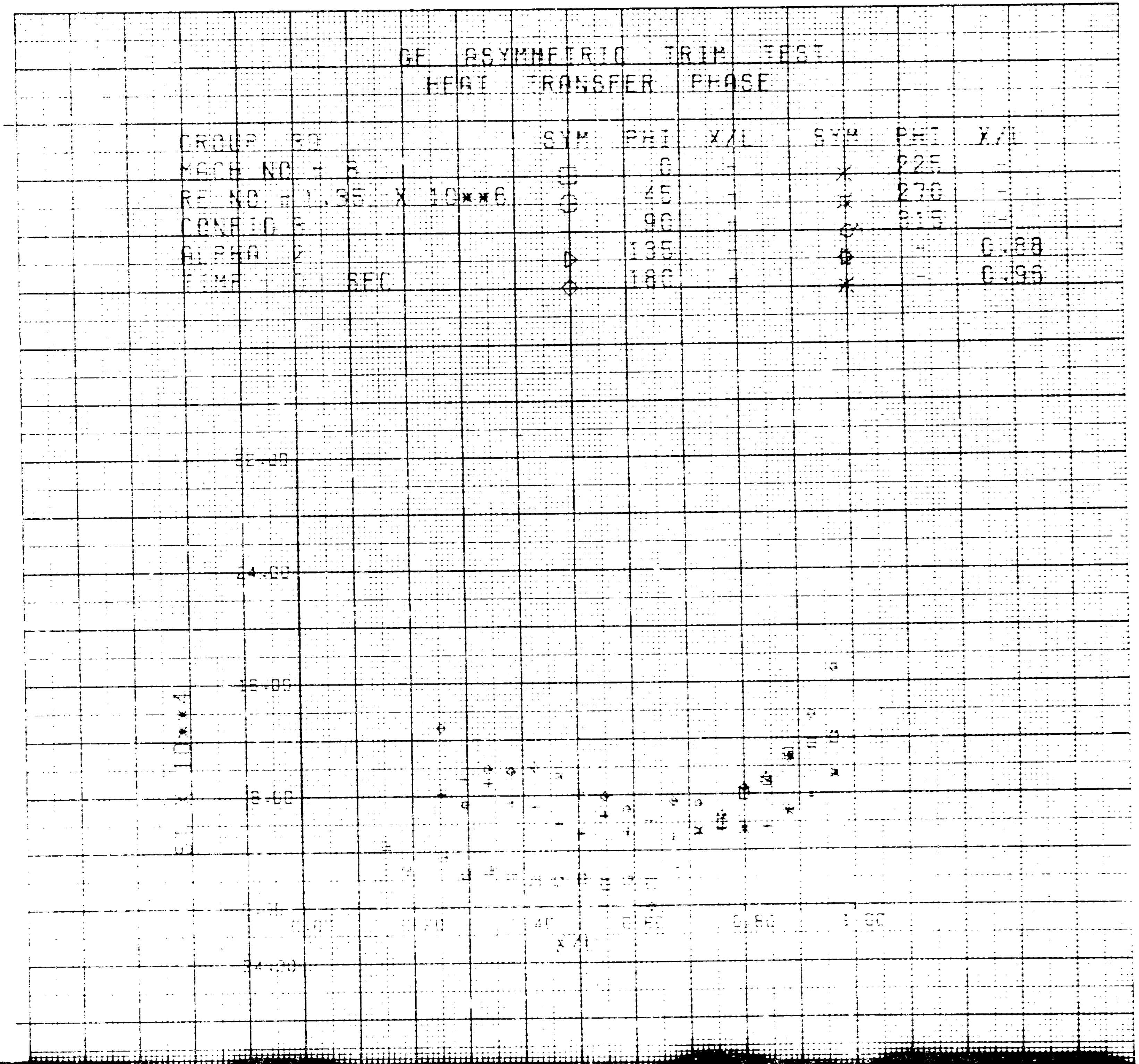
FIGURE 54
ET X 10**4
Y/L
0.00
0.20
0.40
0.60
0.80
1.00
8.00
16.00
24.00
PHI, DEG
80.00
160.00
240.00
320.00
400.00

Figure 54

3

```
                                   7/11/69

                    AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
                      VON KARMAN GAS DYNAMICS FACILITY
                        50 INCH HYPERSONIC TUNNEL B
                               VT09.7-000
GROUP   CONFIG    ALPHA-M      BETA-M      ALPHA-S     ROLL   ALP-P   DATE     MACH NO        PO          TO          TIME
  59       3        1.96          0          1.96         0      0     715       7.97        279.40      1263.67       -.00
   T-INF       P-INF        Q-INF        V-INF        RHO-INF      MU-INF       RE/FT        RE/L         HO
9.2195E 01  5.9915E-02  1.3044E 00  3.7498E 03  2.0655E-05  7.9226E-08  1.3466E 06  1.2353E 06  3.0885E 02

 NO    X/L    PHI    TEMP     SLOPE       Q-STDU       HT           HM           HW          ST

  1   .1538     0   522.22  1.7033E 00  2.0159E-01  3.9288E-04  1.4262E-03  1.2527E 02  4.4316E-04
  2   .1867     0   524.64  7.1602E-01  1.5581E-01  2.1225E-04  8.5711E-04  1.2559E 02  2.6652E-04
  3   .2524     0   526.84  7.2217E-01  2.1594E-01  2.8991E-04  1.1765E-03  1.2538E 02  3.6198E-04
  4   .2943     0   529.31  4.3343E-01  1.3600E-01  1.8636E-04  7.5220E-04  1.2596E 02  2.3392E-04
  5   .3363     0   530.98  4.8069E-01  1.5172E-01  2.0712E-04  8.3694E-04  1.2735E 02  2.5998E-04
  6   .3783     0   532.52  3.9069E-01  1.1744E-01  1.6067E-04  6.4852E-04  1.2772E 02  2.0166E-04
  7   .4203     0   533.46  3.4955E-01  1.0738E-01  1.4709E-04  5.9368E-04  1.2795E 02  1.8461E-04
  8   .4623     0   534.09  3.7270E-01  1.0264E-01  1.4095E-04  5.6864E-04  1.2829E 02  1.7688E-04
  9   .5043     0   535.36  4.0931E-01  1.1084E-01  1.5224E-04  6.1419E-04  1.2840E 02  1.9105E-04
 10   .5463     0   537.53  4.1143E-01  8.7492E-02  1.2052E-04  4.8638E-04  1.2891E 02  1.5123E-04
 11   .5882     0   538.79  1.8340E-01  1.0564E-01  1.4577E-04  5.8820E-04  1.2921E 02  1.8290E-04
 12   .6302     0   540.30  1.3561E-01  9.0797E-02  1.2555E-04  5.0657E-04  1.2951E 02  1.5752E-04
 13   .6722     0   542.84  6.1825E-01  1.5484E-01  2.1493E-04  8.6704E-04  1.3018E 02  2.6961E-04
 14   .8022  315.0  551.16  1.5112E 00  3.9304E-01  5.5283E-04  2.2292E-03  1.3221E 02  6.9316E-04
 15   .7583     0   544.79  1.1080E 00  3.1139E-01  4.6464E-04  1.8142E-03  1.3095E 02  5.8279E-04
 16   .7996     0   546.47  1.5122E 00  4.5233E-01  6.3085E-04  2.5444E-03  1.3103E 02  7.9120E-04
 17   .8409     0   547.51  1.7766E 00  5.0504E-01  7.0540E-04  2.8450E-03  1.3129E 02  8.8464E-04
 18   .8822     0   548.71  2.4798E 00  6.2124E-01  8.6916E-04  3.5052E-03  1.3158E 02  1.0899E-03
 19   .9235     0   549.09  3.4267E 00  6.5806E-01  9.2113E-04  3.7147E-03  1.3167E 02  1.1551E-03
 20   .9648     0   549.96  2.4189E 00  6.7709E-01  9.5009E-04  3.8313E-03  1.3188E 02  1.1913E-03
 21   .2524   45.0  524.95  1.3670E 00  4.0411E-01  5.4719E-04  2.2096E-03  1.2592E 02  6.8707E-04
 22   .2943   45.0  526.96  1.2357E 00  3.9620E-01  5.3795E-04  2.1723E-03  1.2640E 02  6.7540E-04
 23   .3363   45.0  528.89  1.2286E 00  3.6927E-01  5.0263E-04  2.0292E-03  1.2684E 02  6.3099E-04
 24   .3783   45.0  530.47  1.1351E 00  3.4122E-01  4.6551E-04  1.8792E-03  1.2723E 02  5.8434E-04
 25   .4203   45.0  532.67  1.0652E 00  3.0370E-01  4.1557E-04  1.6774E-03  1.2776E 02  5.2159E-04
 26   .4623   45.0  535.66  1.0712E 00  3.0055E-01  4.1294E-04  1.6665E-03  1.2847E 02  5.1821E-04
 27   .5043   45.0  536.69  1.1389E 00  3.0240E-01  4.1612E-04  1.6792E-03  1.2871E 02  5.2216E-04
100   .9648  315.0  554.08  2.1280E 00  5.5983E-01  7.4917E-04  3.1817E-03  1.3286E 02  9.8534E-04
 29   .5882   45.0  539.57  9.9970E-01  2.5616E-01  3.5386E-04  1.4278E-03  1.2940E 02  4.4397E-04
 30   .6302   45.0  541.31  9.0944E-01  2.4470E-01  3.3885E-04  1.3671E-03  1.2981E 02  4.2509E-04
 31   .6722   45.0  545.24  9.6129E-01  2.3597E-01  3.2856E-04  1.3252E-03  1.3075E 02  4.1208E-04
 32   .7170   45.0  546.77  9.7662E-01  2.2990E-01  3.2090E-04  1.2943E-03  1.3111E 02  4.0245E-04
 33   .7583   45.0  545.97  9.9088E-01  2.7302E-01  3.8051E-04  1.5348E-03  1.3092E 02  4.7724E-04
 34   .7996   45.0  547.04  9.4914E-01  2.7753E-01  3.8738E-04  1.5625E-03  1.3118E 02  4.8583E-04
 35   .8409   45.0  548.33  1.3918E 00  3.5218E-01  4.9246E-04  1.9861E-03  1.3149E 02  6.1757E-04
 36   .8822   45.0  549.21  1.7858E 00  3.8884E-01  5.4445E-04  2.1956E-03  1.3170E 02  6.8273E-04
 37   .9235   45.0  550.26  1.4160E 00  4.6400E-01  6.5058E-04  2.6235E-03  1.3194E 02  8.1577E-04
 38   .9648   45.0  552.72  2.2469E 00  5.4033E-01  7.6023E-04  3.0652E-03  1.3253E 02  9.5313E-04
 39   .2524   90.0  528.43  1.6041E 00  4.7419E-01  6.4512E-04  2.6045E-03  1.2675E 02  8.0988E-04
 40   .2943   90.0  529.42  1.6671E 00  5.3452E-01  7.2818E-04  2.9397E-03  1.2699E 02  9.1411E-04
 41   .3363   90.0  530.59  1.5287E 00  5.1407E-01  7.0143E-04  2.8316E-03  1.2726E 02  8.8048E-04
 42   .3783   90.0  532.65  1.3730E 00  4.3335E-01  5.9312E-04  2.3940E-03  1.2780E 02  7.4443E-04
 43   .4203   90.0  534.87  1.3956E 00  4.1256E-01  5.6624E-04  2.2853E-03  1.2828E 02  7.1061E-04
 44   .4623   90.0  535.17  1.0912E 00  3.3896E-01  4.6541E-04  1.8783E-03  1.2835E 02  5.8407E-04
 45   .5043   90.0  537.11  1.1036E 00  3.0414E-01  4.1872E-04  1.6897E-03  1.2881E 02  5.2543E-04
 46   .5463   90.0  539.51  1.3061E 00  3.7297E-01  5.1518E-04  2.0787E-03  1.2938E 02  6.4637E-04
 47   .5882   90.0  539.98  1.1986E 00  3.0819E-01  4.2598E-04  1.7147E-03  1.2950E 02  5.3444E-04
 48   .6302   90.0  540.98  1.2737E 00  3.5094E-01  4.8573E-04  1.9597E-03  1.2973E 02  6.0937E-04
 49   .6722   90.0  544.88  1.1288E 00  2.8280E-01  3.9355E-04  1.5874E-03  1.3066E 02  4.9362E-04
 50   .7170   90.0  546.59  1.2942E 00  2.9301E-01  4.0873E-04  1.6485E-03  1.3107E 02  5.1261E-04
 51   .7583   90.0  543.61  1.1944E 00  3.1114E-01  4.3222E-04  1.7430E-03  1.3036E 02  5.4216E-04
 52   .7996   90.0  544.27  1.3081E 00  3.4077E-01  4.7382E-04  1.9113E-03  1.3052E 02  5.9432E-04
 53   .8409   90.0  544.83  1.2459E 00  3.2214E-01  4.4824E-04  1.8041E-03  1.3036E 02  5.6222E-04
 54   .8822   90.0  545.09  1.5873E 00  3.8963E-01  5.4298E-04  2.1961E-03  1.3040E 02  6.8101E-04
 55   .9235   90.0  545.97  1.2388E 00  4.4220E-01  6.1630E-04  2.4856E-03  1.3092E 02  7.7296E-04
 56   .9648   90.0  548.15  2.2217E 00  5.3676E-01  7.4759E-04  3.0150E-03  1.3144E 02  9.3751E-04
 57   .2524  135.0  523.39  3.1685E-01  9.9575E-02  1.3455E-04  5.4335E-04  1.2555E 02  1.6896E-04
 58   .2943  135.0  525.08  2.0960E 00  6.7203E-01  9.1013E-04  3.6751E-03  1.2595E 02  1.1428E-03
 59   .3363  135.0  525.67  1.8745E 00  5.9165E-01  8.0191E-04  3.2380E-03  1.2609E 02  1.0069E-03
 60   .3783  135.0  526.65  1.6478E 00  5.1188E-01  6.9284E-04  2.7978E-03  1.2585E 02  8.6997E-04
 61   .4203  135.0  528.46  1.7801E 00  5.3510E-01  7.2803E-04  2.9392E-03  1.2676E 02  9.1396E-04
 62   .4623  135.0  530.24  1.6302E 00  4.7368E-01  6.4601E-04  2.6079E-03  1.2718E 02  8.1093E-04
 63   .5043  135.0  531.88  1.7162E 00  4.3869E-01  5.9965E-04  2.4205E-03  1.2757E 02  7.5265E-04
 64   .5463  135.0  533.10  1.6261E 00  4.3182E-01  5.9123E-04  2.3864E-03  1.2786E 02  7.4205E-04
 65   .5882  135.0  534.85  1.5361E 00  4.0792E-01  5.5986E-04  2.2595E-03  1.2828E 02  7.0260E-04
 66   .6302  135.0  535.91  1.5582E 00  4.4033E-01  6.0523E-04  2.4425E-03  1.2853E 02  7.5950E-04
 67   .6722  135.0  540.81  1.6764E 00  4.0315E-01  5.5787E-04  2.2508E-03  1.2969E 02  6.9988E-04
 68   .7170  135.0  541.91  1.6580E 00  3.9044E-01  5.4110E-04  2.1830E-03  1.2996E 02  6.7880E-04
 69   .7583  135.0  [illegible]  1.2193E 00  3.4211E-01  4.7249E-04  1.9064E-03  1.2936E 02  5.9280E-04
 70   .7996  135.0  541.29  1.5147E 00  4.6917E-01  6.4966E-04  2.6210E-03  1.2981E 02  8.1502E-04
 71   .8409  135.0  542.34  1.7859E 00  4.9207E-01  6.8236E-04  2.7528E-03  1.3006E 02  8.5599E-04
 72   .8822  135.0  542.97  2.1205E 00  5.7366E-01  7.9622E-04  3.2120E-03  1.3021E 02  9.9879E-04
 73   .9235  135.0  543.77  2.5365E 00  6.2264E-01  8.6514E-04  3.4899E-03  1.3040E 02  1.0852E-03
 74   .9648  135.0  548.71  3.2231E 00  7.7509E-01  1.0846E-03  4.3732E-03  1.3158E 02  1.3599E-03
 75   .2524  180.0  524.48  2.8841E 00  7.5093E-01  1.0150E-03  4.1029E-03  1.2581E 02  1.2754E-03
 76   .2943  180.0  527.30  1.3416E 00  4.3013E-01  5.8428E-04  2.3591E-03  1.2648E 02  7.3356E-04
 77   .3363  180.0  529.71  1.4652E 00  5.7502E-01  7.8367E-04  3.1637E-03  1.2705E 02  9.8375E-04
 78   .3783  180.0  531.82  1.8822E 00  5.6578E-01  7.7330E-04  3.1215E-03  1.2755E 02  9.7062E-04
 79   .4203  180.0  533.86  1.9677E 00  5.8005E-01  7.9502E-04  3.2048E-03  1.2804E 02  9.9777E-04
 80   .4623  180.0  535.94  1.8820E 00  5.3746E-01  7.3876E-04  2.9813E-03  1.2853E 02  9.2704E-04
 81   .5043  180.0  537.90  1.8334E 00  4.5930E-01  6.3202E-04  2.5544E-03  1.2900E 02  7.9429E-04
 82   .5463  180.0  539.86  1.7063E 00  4.5311E-01  6.2618E-04  2.5265E-03  1.2947E 02  7.8562E-04
 83   .5882  180.0  541.03  1.4910E 00  3.9593E-01  5.4820E-04  2.2117E-03  1.2979E 02  6.8773E-04
 84   .6302  180.0  539.00 -1.3898E-02 -3.6905E-03 -5.0951E-06 -2.0555E-05  1.2926E 02 -6.3915E-06
 85   .6722  180.0  547.48  1.7773E 00  4.2741E-01  5.9695E-04  2.4075E-03  1.3128E 02  7.4863E-04
 86   .7170  180.0  548.92  1.7621E 00  4.1695E-01  5.8071E-04  2.3417E-03  1.3163E 02  7.2821E-04
 87   .7583  180.0  547.29  1.5120E 00  3.6841E-01  5.1442E-04  2.0747E-03  1.3124E 02  6.4513E-04
 88   .7996  180.0  549.98  1.8323E 00  4.7731E-01  6.6495E-04  2.6941E-03  1.3164E 02  8.3773E-04
 89   .8409  180.0  549.76  2.0387E 00  5.2092E-01  7.2988E-04  2.9413E-03  1.3183E 02  9.1522E-04
 90   .8822  180.0  550.69  2.5786E 00  5.9421E-01  8.3365E-04  3.3618E-03  1.3205E 02  1.0453E-03
 91   .9235  180.0  552.07  3.1450E 00  7.7200E-01  1.0851E-03  4.3753E-03  1.3237E 02  1.3605E-03
 92   .9648  180.0  554.94  4.1462E 00  9.5546E-01  1.3484E-03  5.4362E-03  1.3305E 02  1.6904E-03
 93   .8822  225.0  554.26  2.6787E 00  5.3112E-01  7.4887E-04  3.0192E-03  1.3289E 02  9.3881E-04
 94   .9648  225.0  555.89  3.1879E 00  7.6603E-01  1.0835E-03  4.3677E-03  1.3329E 02  1.3581E-03
 95   .7170  270.0  552.61  1.3515E 00  3.0472E-01  4.2868E-04  1.7284E-03  1.3251E 02  5.3746E-04
 96   .7996  270.0  555.07  1.1674E 00  3.1001E-01  4.3762E-04  1.7643E-03  1.3310E 02  5.4860E-04
 97   .8822  270.0  557.43  1.4722E 00  3.7615E-01  5.3277E-04  2.1475E-03  1.3366E 02  6.6778E-04
 98   .9648  270.0  556.76  2.2172E 00  5.3314E-01  7.5448E-04  3.0413E-03  1.3350E 02  9.4571E-04
```

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 59 SYM PHI X4 SYM PHI X4


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 83
MACH NO = 8
RE NO = 1.35 X 10**6
CONFIG 3
ALPHA 2
TIME SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96
32.00
24.00
16.00
8.00
-8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

2

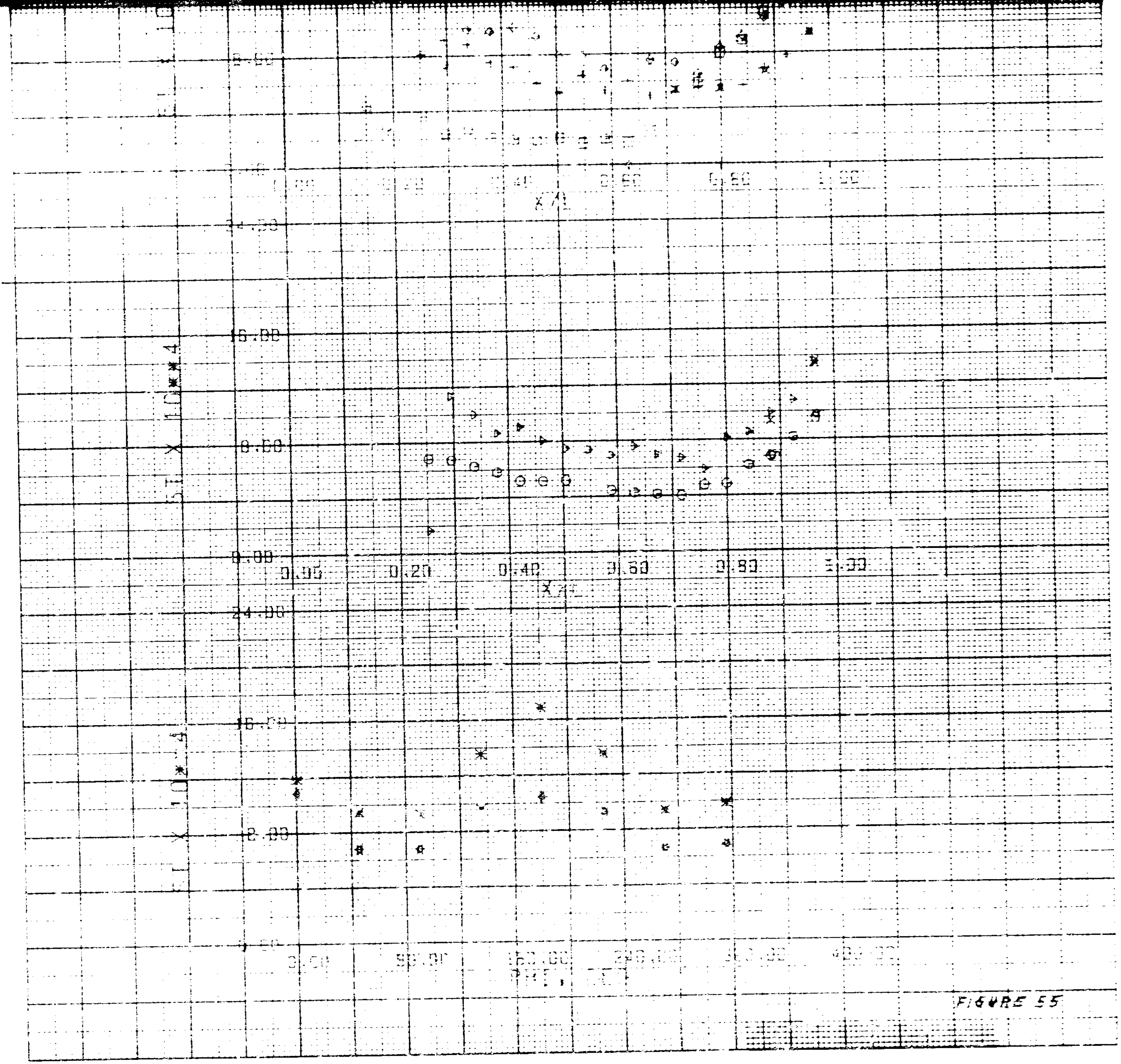
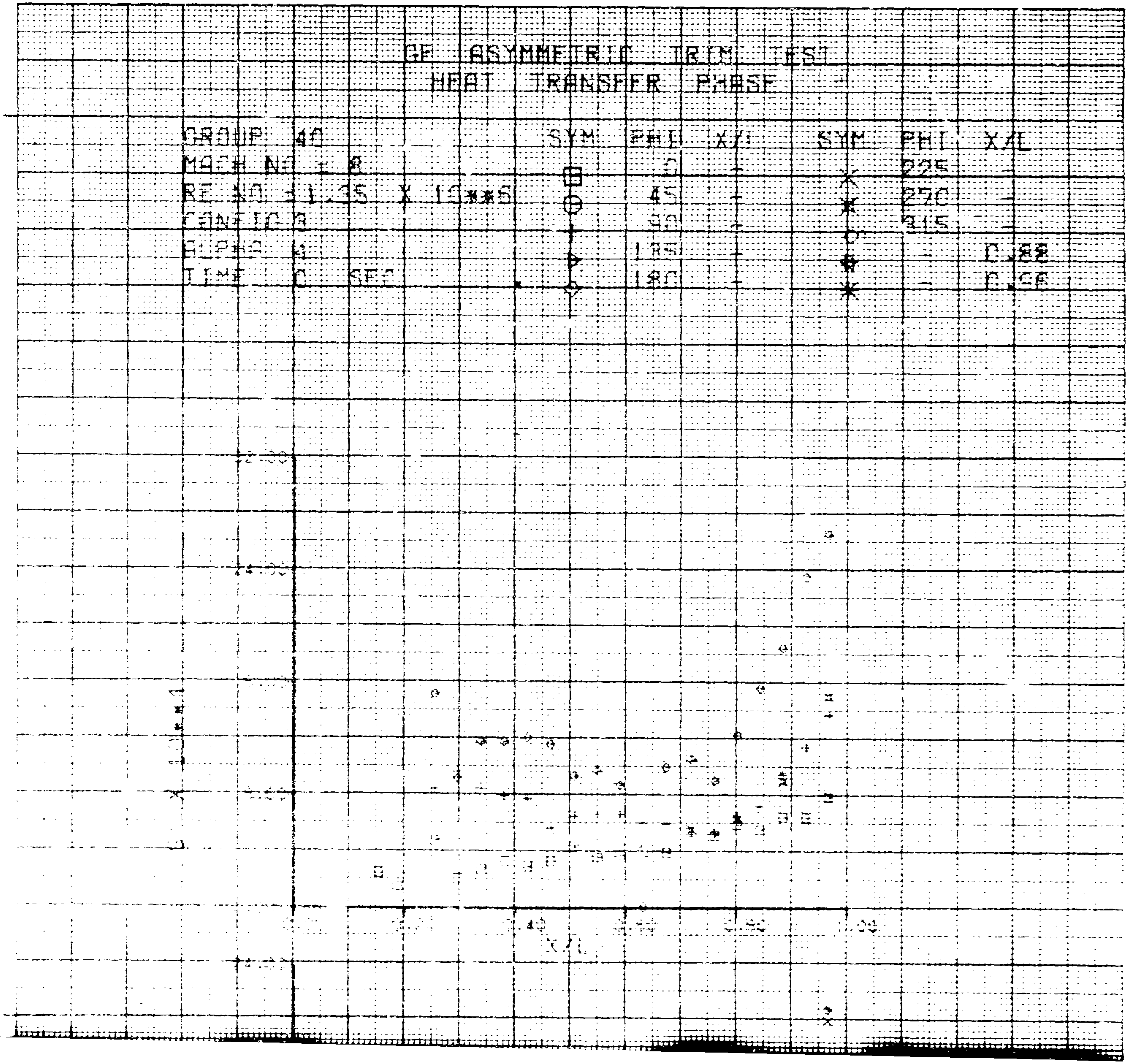

0.00
0.20
0.40
0.60
0.80
1.00
X/Λ
24.00
16.00
8.00
0.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/Λ
24.00
16.00
8.00
ET X 10**4
0.00
80.00
160.00
240.00
320.00
400.00
FIGURE 55

Figure 55

```
                                        7/14/69

                        ARO, INC. - ARNOLD AFS, TENNESSEE
                        VON KARMAN GAS DYNAMICS FACILITY
                          50 INCH HYPERSONIC TUNNEL B
                                  V10967-000
[illegible]   [illegible]   ALPHA-M    BETA-M    ALPHA-S    ROLL    ALP-P    DATE    MACH NO      PO        TO       TIME
    40           3          3.99         0        3.99         0       0      715      7.97      278.78   1257.95    -.00
  T-INF          P-INF        Q-INF        V-INF       RHO-INF       MU-INF       RE/FT        RE/[illegible]      HO
9.1791E 01   2.9209E-02   1.3018E 00   3.7410E 03   2.0744E-05   7.3967E-08   1.3544E 06   1.2924E 06   3.0741E 02

TC NO    X/L       PHI     TEMP      SLOPE        Q-STOW        HT           [illegible]  [illegible]  ST

   1  [illegible]     0    531.71   6.8870E-01   1.4972E-01   2.0611E-04   8.3272E-04   1.2740E 02   2.5849E-04
   2   .1667          0    529.14   6.1364E-01   9.0841E-02   1.2465E-04   5.0338E-04   1.2693E 02   1.5635E-04
   3   .2524          0    529.80   9.6045E-01   2.8090E-01   3.8500E-04   1.5582E-03   1.2707E 02   4.8390E-04
   4   .2941          0    535.04   1.4935E-01   1.2605E-01   1.7436E-04   7.0341E-04   1.2832E 02   2.1864E-04
   5  [illegible]     0    530.87   5.1371E-01   1.6214E-01   2.2485E-04   9.0749E-04   1.2876E 02   2.8193E-04
   6   .3783          0    534.15   6.4078E-01   1.9762E-01   2.6760E-04   1.0801E-03   1.2906E 02   3.3550E-04
   7   .4203          0    538.72   5.9773E-01   1.7368E-01   2.4148E-04   9.7480E-04   1.2720E 02   3.0273E-04
   8   .4623          0    539.80   7.6152E-01   1.9329E-01   2.6915E-04   1.0863E-03   1.2945E 02   3.3741E-04
   9   .5043          0    540.19   9.3289E-01   2.5230E-01   3.5158E-04   1.4190E-03   1.2953E 02   4.4074E-04
  10   .5463          0    542.07   7.4222E-01   2.08[illegible]E-01   2.9094E-04   1.1739E-03   1.2999E 02   3.6463E-04
  11   .5882          0    543.34   7.9943E-01   2.2027E-01   3.0823E-04   1.2430E-03   1.3030E 02   3.8613E-04
  12  [illegible]     0    544.61   8.5772E-01   2.3205E-01   3.2530E-04   1.3129E-03   1.3060E 02   4.0769E-04
  13  [illegible]     0    544.95   9.1836E-01   2.2756E-01   3.1916E-04   1.2876E-03   1.3050E 02   3.9996E-04
  14  [illegible]   315.0  546.02   1.8657E 00   4.8601E-01   6.9219E-04   2.7920E-03   1.3312E 02   8.6721E-04
  15  [illegible]     0    548.97   1.2230E 00   2.9411E-01   4.1494E-04   1.6735E-03   1.3164E 02   5.1979E-04
  16  [illegible]     0    550.66   1.1989E 00   3.3619E-01   4.7560E-04   1.9184E-03   1.3204E 02   5.9580E-04
  17  [illegible]     0    551.71   1.2339E 00   3.1526E-01   4.4640E-04   1.8005E-03   1.3224E 02   5.5925E-04
  18   .8422          0    552.93   1.4708E 00   3.6996E-01   5.2474E-04   2.1163E-03   1.3258E 02   6.5735E-04
  19   .9215          0    553.20   1.4673E 00   3.6759E-01   5.2160E-04   2.1036E-03   1.3265E 02   6.5340E-04
  20  [illegible]     0    551.94   1.8651E 00   4.4851E-01   6.3525E-04   2.5622E-03   1.3234E 02   7.9582E-04
  21   .2524        45.0   528.56   1.3428E 00   3.9695E-01   5.4473E-04   2.1974E-03   1.2678E 02   6.8267E-04
  22   .2941        45.0   531.26   1.1006E 00   3.5288E-01   4.8694E-04   1.9640E-03   1.2790E 02   6.1005E-04
  23   .3363        45.0   535.32   9.9010E-01   2.9762E-01   4.1186E-04   1.6617E-03   1.2839E 02   5.1644E-04
  24  [illegible]   45.0   537.32   9.6691E-01   2.9059E-01   4.0333E-04   1.6281E-03   1.2886E 02   5.0569E-04
  25  [illegible]   45.0   538.43   9.0948E-01   2.6426E-01   3.6727E-04   1.4824E-03   1.2913E 02   4.6045E-04
  26  [illegible]   45.0   541.15   9.0687E-01   2.5445E-01   3.5498E-04   1.4326E-03   1.2978E 02   4.4497E-04
  27  [illegible]   45.0   542.40   9.0735E-01   2.4095E-01   3.3677E-04   1.3590E-03   1.3009E 02   4.2212E-04
  28  [illegible]  315.0   557.54   2.3709E 00   5.7016E-01   8.1405E-04   3.2823E-03   1.3368E 02   1.0195E-03
  29  [illegible]   45.0   544.74   7.7340E-01   2.1310E-01   2.9878E-04   1.2056E-03   1.3063E 02   3.7446E-04
  30  [illegible]   45.0   546.30   7.9002E-01   2.1372E-01   3.0034E-04   1.2117E-03   1.3100E 02   3.7637E-04
  31  [illegible]   45.0   547.62   8.7731E-01   2.3990E-01   3.3773E-04   1.3625E-03   1.3132E 02   4.2320E-04
  32  [illegible]   45.0   549.36   8.9119E-01   2.0987E-01   2.9617E-04   1.1947E-03   1.3173E 02   3.7108E-04
  33  [illegible]   45.0   551.29   9.4316E-01   2.5906E-01   3.6774E-04   1.4833E-03   1.3219E 02   4.6071E-04
  34  [illegible]   45.0   552.74   1.0803E 00   3.0312E-01   4.2946E-04   1.7337E-03   1.3255E 02   5.3849E-04
  35  [illegible]   45.0   554.76   1.4524E 00   3.9293E-01   5.5879E-04   2.2534E-03   1.3302E 02   6.9993E-04
  36  [illegible]   45.0   556.46   1.6817E 00   4.4234E-01   6.3052E-04   2.[illegible]E-03   1.3341E 02   7.8470E-04
  37   .9235         5.0   555.86   2.0334E 00   5.1956E-01   7.4109E-04   2.9883E-03   1.3352E 02   9.2817E-04
  38  [illegible]   -5.0   556.19   2.3152E 00   5.5675E-01   7.9337E-04   3.1992E-03   1.3336E 02   9.9368E-04
  39   .2524        90.0   532.93   1.6705E 00   4.9381E-01   6.8109E-04   2.7[illegible]E-03   1.2782E 02   8.5414E-04
  40   .2941        90.0   536.81   1.7500E 00   5.6108E-01   7.7805E-04   3.1407E-03   1.2874E 02   9.7553E-04
  41   .3363        90.0   538.27   1.5506E 00   4.9224E-01   6.8397E-04   2.7604E-03   1.2909E 02   8.5750E-04
  42   .3783        90.0   539.47   1.4544E 00   4.5904E-01   6.3886E-04   2.5785E-03   1.2938E 02   8.0090E-04
  43   .4202        90.0   540.94   1.5224E 00   4.5004E-01   6.2770E-04   2.5332E-03   1.2973E 02   7.8684E-04
  44   .4623        90.0   541.18   1.1572E 00   3.2841E-01   4.5810E-04   1.8491E-03   1.2978E 02   5.7434E-04
  45   .5043        90.0   543.00   1.3566E 00   3.7899E-01   5.2590E-04   2.1222E-03   1.3022E 02   6.5916E-04
  46   .5463        90.0   543.14   1.3541E 00   3.9070E-01   5.4098E-04   2.1830E-03   1.3025E 02   6.7805E-04
  47   .5882        90.0   545.58   1.3649E 00   3.8297E-01   5.3760E-04   2.1[illegible]E-03   1.3083E 02   6.7373E-04
  48  [illegible]   90.0   546.70   1.2545E 00   3.4566E-01   4.8600E-04   1.9608E-03   1.3110E 02   6.0902E-04
  49   .6722        90.0   546.92   1.5743E 00   3.4430E-01   4.8423E-04   1.9536E-03   1.3115E 02   6.0679E-04
  50  [illegible]   90.0   549.59   1.2394E 00   2.9190E-01   4.1219E-04   1.6627E-03   1.3179E 02   5.1645E-04
  51  [illegible]   90.0   549.33   1.1687E 00   3.0444E-01   4.2962E-04   1.7330E-03   1.3172E 02   5.3829E-04
  52  [illegible]   90.0   550.82   1.6311E 00   3.7281E-01   5.2721E-04   2.1266E-03   1.3208E 02   6.6052E-04
  53   .8409        90.0   551.55   1.6434E 00   4.1170E-01   5.8282E-04   2.3508E-03   1.3225E 02   7.3016E-04
  54   .8622        90.0   553.47   2.1920E 00   5.3800E-01   7.6380E-04   3.0804E-03   1.3271E 02   9.5679E-04
  55   .9235        90.0   553.69   2.6984E 00   6.4897E-01   9.2142E-04   3.7160E-03   1.3276E 02   1.1542E-03
  56   .9248        90.0   552.65   1.2391E 00   7.7693E-01   1.1044E-03   4.4542E-03   1.3251E 02   1.3835E-03
  57   .2524       135.0   528.22   6.7918E-01   1.4165E-01   1.9412E-04   7.8395E-04   1.2670E 02   2.4350E-04
  58   .2941       135.0   532.07   2.3100E 00   7.4062E-01   1.0203E-03   4.1197E-03   1.2761E 02   1.2796E-03
  59   .3363       135.0   533.02   2.2016E 00   6.9490E-01   9.5857E-04   3.8702E-03   1.2785E 02   1.2021E-03
  60   .3783       135.0   531.43   1.9698E 00   6.0288E-01   8.2982E-04   3.3507E-03   1.2746E 02   1.0407E-03
  61   .4203       135.0   534.90   2.0214E 00   6.0763E-01   8.4037E-04   3.3927E-03   1.2829E 02   1.0538E-03
  62   .4623       135.0   536.20   1.9165E 00   5.5687E-01   7.7155E-04   3.1146E-03   1.2860E 02   9.6740E-04
  63   .5043       135.0   537.69   1.9682E 00   5.0290E-01   6.9818E-04   2.8182E-03   1.2894E 02   8.7534E-04
  64   .5463       135.0   538.59   1.9844E 00   5.2696E-01   7.3255E-04   2.9568E-03   1.2917E 02   9.1830E-04
  65   .5882       135.0   539.92   1.8013E 00   4.9427E-01   6.8837E-04   2.7783E-03   1.2948E 02   8.6296E-04
  66   .6302       135.0   540.77   1.8608E 00   4.8882E-01   6.8159E-04   2.7508E-03   1.2968E 02   8.5440E-04
  67   .6722       135.0   543.11   1.3746E 00   4.7685E-01   6.6629E-04   2.6866E-03   1.3024E 02   8.3260E-04
  68   .7170       135.0   544.71   1.9093E 00   4.4962E-01   6.3038E-04   2.5435E-03   1.3062E 02   7.9004E-04
  69   .7563       135.0   543.74   1.3710E 00   3.6468E-01   5.3860E-04   2.1733E-03   1.3039E 02   6.7505E-04
  70   .7996       135.0   546.57   2.0988E 00   6.0982E-01   8.5724E-04   3.4585E-03   1.3107E 02   1.0742E-03
  71   .8409       135.0   548.30   2.3169E 00   6.3839E-01   8.9958E-04   3.6290E-03   1.3148E 02   1.1272E-03
  72   .8922       135.0   549.41   2.9554E 00   7.9967E-01   1.1286E-03   4.5527E-03   1.3174E 02   1.4141E-03
  73   .9235       135.0   551.21   3.9283E 00   9.3925E-01   1.3290E-03   5.3605E-03   1.3217E 02   1.6650E-03
  74  [illegible]  135.0   551.93   4.8800E 00   1.1757E 00   1.6653E-03   6.7166E-03   1.3234E 02   2.0862E-03
  75   .2524       180.0   536.81   3.0450E 00   8.8477E-01   1.2168E-03   4.9133E-03   1.2731E 02   1.5261E-03
  76   .2943       180.0   534.71   1.6708E 00   5.3570E-01   7.4071E-04   2.9903E-03   1.2824E 02   9.2881E-04
  77   .3363       180.0   536.34   2.3153E 00   6.8444E-01   9.4655E-04   3.8201E-03   1.2864E 02   1.1893E-03
  78   .3783       180.0   537.61   2.2719E 00   6.8294E-01   9.4808E-04   3.8269E-03   1.2893E 02   1.1887E-03
  79   .4203       180.0   539.84   2.9532E 00   6.9741E-01   9.7117E-04   3.9105E-03   1.2946E 02   1.2175E-03
  80   .4623       180.0   541.61   2.3394E 00   6.6807E-01   9.3262E-04   3.7637E-03   1.2989E 02   1.1690E-03
  81   .5043       180.0   543.10   2.1479E 00   5.3810E-01   7.5275E-04   3.0375E-03   1.3024E 02   9.4348E-04
  82   .5463       180.0   544.40   2.1025E 00   5.5832E-01   7.8245E-04   3.1572E-03   1.3055E 02   9.8064E-04
  83   .5882       180.0   545.51   1.8834E 00   5.0067E-01   7.0275E-04   2.8354E-03   1.3081E 02   8.8070E-04
  84  [illegible]  180.0   5[illegible].47   1.1264E-02   8.1022E-03   1.1555E-05   4.6630E-05   1.2938E 02   1.4486E-05
  85   .6722       180.0   549.75   2.7608E 00   5.6916E-01   8.0368E-04   3.2419E-03   1.3183E 02   1.0070E-03
  86   .7170       180.0   551.36   2.5475E 00   5.9941E-01   8.4905E-04   3.4246E-03   1.3225E 02   1.0637E-03
  87   .7563       180.0   551.31   2.1451E 00   5.1586E-01   7.3002E-04   2.9445E-03   1.3220E 02   9.1458E-04
  88   .7996       180.0   551.35   2.4668E 00   6.9471E-01   9.8596E-04   3.9764E-03   1.3266E 02   1.2351E-03
  89  [illegible]  180.0   554.78   3.4442E 00   8.8004E-01   1.2519E-03   5.0685E-03   1.3307E 02   1.5681E-03
  90  [illegible]  180.0   556.60   4.5270E 00   1.0432E 00   1.4874E-03   5.9958E-03   1.3346E 02   1.8629E-03
  91  [illegible]  180.0   557.67   5.3897E 00   1.3713E 00   1.8892E-03   7.6173E-03   1.3370E 02   2.3660E-03
  92  [illegible]  180.0   559.29   6.[illegible]E 00   1.6876E 00   2.1293E-03   8.5848E-03   1.3410E 02   2.6665E-03
  93  [illegible]  225.0   558.97   2.9527E 00   7.5444E-01   1.0794E-03   4.3518E-03   1.3402E 02   1.3517E-03
  94  [illegible]  225.0   559.71   4.[illegible]E 00   1.1167E 00   1.5993E-03   6.4480E-03   1.3420E 02   2.0028E-03
  95  [illegible]  270.0   554.71   1.4097E 00   3.1786E-01   4.5203E-04   1.8229E-03   1.3310E 02   5.6621E-04
  96  [illegible]  270.0   560.29   [illegible]   3.5914E-01   5.1316E-04   2.0696E-03   1.3434E 02   6.4283E-04
  97  [illegible]  270.0   561.58   1.4[illegible]E 00   5.0669E-01   7.2749E-04   2.9327E-03   1.3462E 02   9.1090E-04
  98  [illegible]  270.0   560.00   1.9600E 00   8.4187E-01   1.2062E-03   4.8629E-03   1.3427E 02   1.5134E-03
```

157

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM. PHI X/L SYM. PHI X/L
GROUP 40


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 40
MACH NO = 8
RE NO = 1.35 X 10**5
CONFIG B
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96
.40
.60
.80
1.00
X/L

2

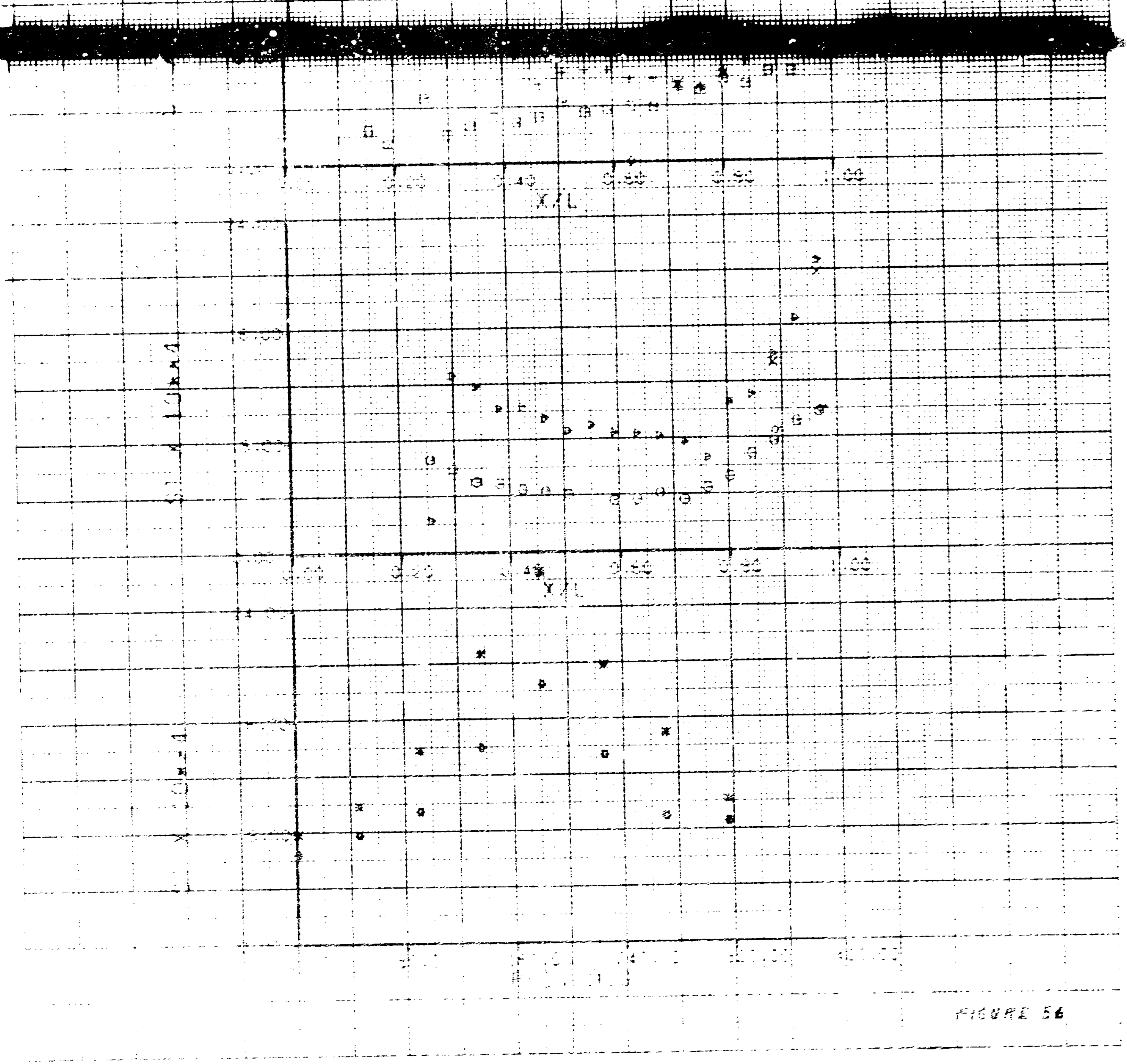
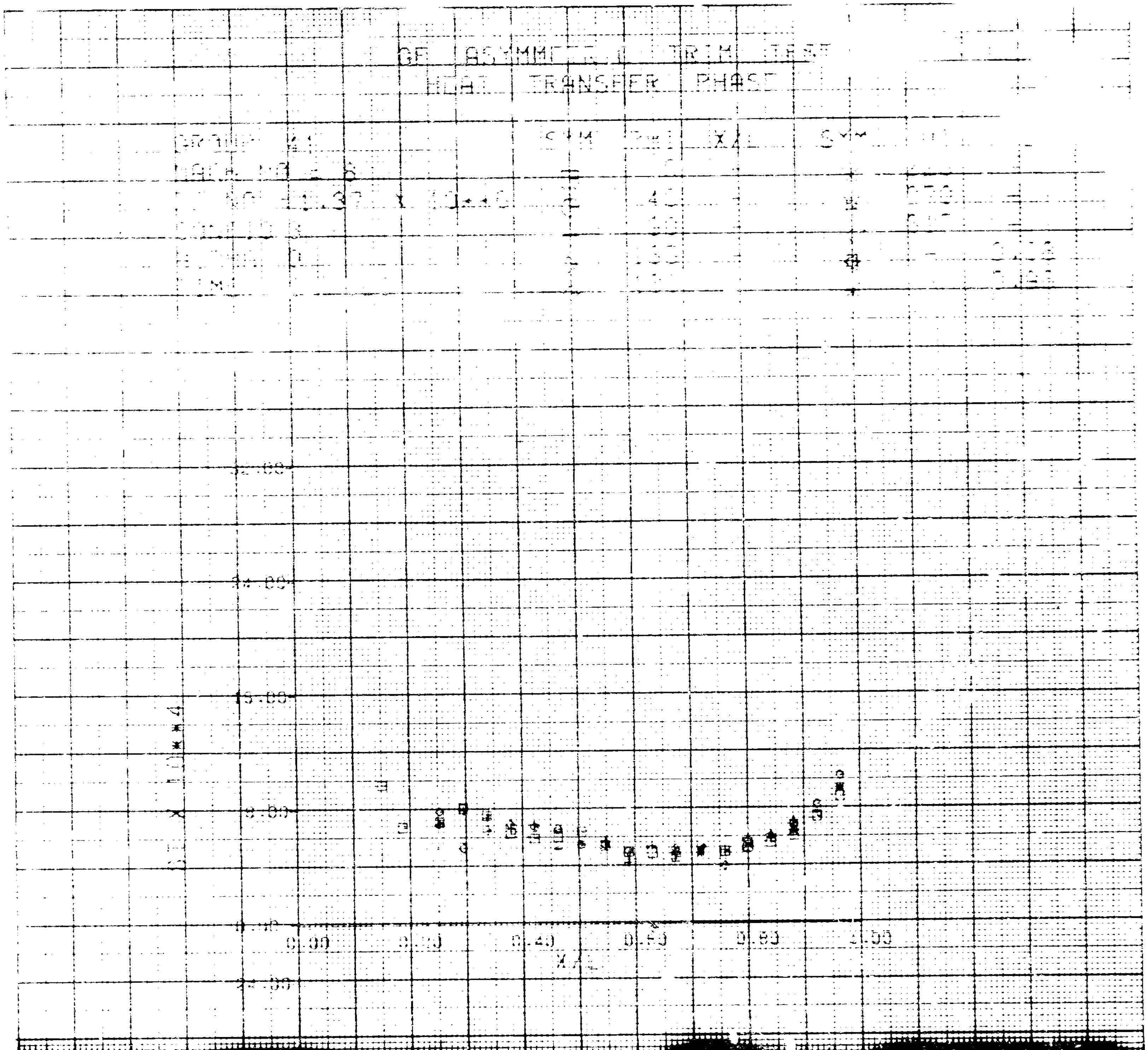


Figure 56

3

```
                                        7/14/69

                     AEDC(ARO),INC., ARNOLD AFS, TENNESSEE
                     VON KARMAN GAS DYNAMICS FACILITY
                       50 INCH HYPERSONIC TUNNEL B
                              VT0947-000
GROUP  CONFIG   ALPHA-M    BETA-M    ALPHA-S    ROLL   ALP-P   DATE    MACH NO      PO        TO        TIME
 41       3        .03        0         .01       0       0     715      7.97      280.20    1254.80      -.00
   T-INF      P-INF      Q-INF       V-INF      RHO-INF      MU-INF      RE/FT       RE/L        HO
 9.1565E 01 2.5411E-02 1.1300E 00 3.7364E 03 2.6955E-05 7.3717E-08 1.3664E 06 1.2518E 05 3.0002E 02

TC NO   X/L     PHI    TEMP     QDOT      Q-STDO       HT          H*         HW         ST

   1   .1900      0   523.90  1.4403E 00  5.7997E-01  7.0722E-04  3.1065E-03  1.2584E 02  9.0137E-04
   2   .2107      0   524.80  1.2292E 00  5.0172E-01  5.6997E-04  2.2230E-03  1.2578E 02  6.8559E-04
   3   .2526      0   526.56  1.0262E 00  4.2100E-01  [illegible]  2.3359E-03  1.2630E 02  7.2058E-04
   4   .2943      0   529.00  1.0700E 00  4.7591E-01  6.5277E-04  2.6487E-03  1.2640E 02  8.1727E-04
   5   .3363      0   530.56  1.0075E 00  4.4426E-01  6.1342E-04  2.4779E-03  1.2726E 02  7.6442E-04
   6   .3783      0   531.71  1.0461E 00  3.7276E-01  5.1555E-04  2.0820E-03  1.2734E 02  6.4243E-04
   7   .4203      0   532.33  1.2059E 00  3.5039E-01  4.8498E-04  1.9585E-03  1.2768E 02  6.0431E-04
   8   .4623      0   533.67  1.2000E 00  3.5472E-01  4.9190E-04  1.9843E-03  1.2800E 02  6.1208E-04
   9   .5043      0   533.98  1.0000E 00  3.7622E-01  5.2193E-04  2.1075E-03  1.2807E 02  6.5029E-04
  10   .5463      0   535.83  1.1867E 00  3.1613E-01  4.3976E-04  1.7750E-03  1.2853E 02  5.4786E-04
  11   .5882      0   537.00  1.1505E 00  2.9138E-01  4.0593E-04  1.6389E-03  1.2879E 02  5.0568E-04
  12   .6302      0   538.66  1.1600E 00  2.8670E-01  4.0043E-04  1.6165E-03  1.2918E 02  4.9878E-04
  13   .6722      0   542.18  1.0710E 00  2.6842E-01  3.7682E-04  1.5209E-03  1.3009E 02  4.6927E-04
  99   .8022  315.0   548.04  1.6940E 00  3.9941E-01  5.5167E-04  2.2250E-03  1.3163E 02  6.8079E-04
  15   .7583      0   543.20  1.1960E 00  2.8764E-01  4.0452E-04  1.6328E-03  1.3028E 02  5.0375E-04
  16   .7996      0   544.20  1.3053E 00  3.0451E-01  4.2864E-04  1.7229E-03  1.3055E 02  5.3377E-04
  17   .8409      0   545.30  1.2568E 00  3.2111E-01  4.5250E-04  1.8261E-03  1.3073E 02  5.6347E-04
  18   .8822      0   546.00  1.5050E 00  3.5190E-01  4.9660E-04  2.0039E-03  1.3094E 02  6.1812E-04
  19   .9235      0   546.31  1.6942E 00  4.2643E-01  5.9906E-04  2.4174E-03  1.3100E 02  7.4590E-04
  20   .9648      0   548.49  2.0430E 00  5.0333E-01  7.1261E-04  2.8752E-03  1.3152E 02  8.8717E-04
  21   .2526   45.0   523.48  1.6327E 00  4.8264E-01  6.5995E-04  2.6654E-03  1.2557E 02  8.2273E-04
  22   .2943   45.0   526.14  1.6337E 00  4.5967E-01  6.3084E-04  2.5449E-03  1.2620E 02  7.0633E-04
  23   .3363   45.0   527.74  1.4276E 00  4.2912E-01  5.9021E-04  2.3841E-03  1.2658E 02  7.3562E-04
  24   .3783   45.0   529.36  1.2590E 00  3.6600E-01  5.0546E-04  2.0416E-03  1.2697E 02  6.2993E-04
  25   .4203   45.0   530.98  1.0830E 00  3.1485E-01  4.3498E-04  1.7567E-03  1.2735E 02  5.4205E-04
  26   .4623   45.0   533.05  1.0970E 00  3.6673E-01  5.0867E-04  2.0540E-03  1.2804E 02  6.3378E-04
  27   .5043   45.0   535.05  1.1041E 00  3.1445E-01  4.3688E-04  1.7640E-03  1.2812E 02  5.4430E-04
 100   .9648  315.0   553.04  1.4983E 00  4.8056E-01  6.8478E-04  2.7623E-03  1.3261E 02  8.5231E-04
  29   .5882   45.0   537.39  1.1037E 00  3.0410E-01  4.2388E-04  1.7113E-03  1.2888E 02  5.2803E-04
  30   .6302   45.0   539.26  1.1735E 00  2.9042E-01  4.0588E-04  1.6384E-03  1.2933E 02  5.0555E-04
  31   .6722   45.0   546.58  1.1718E 03  2.8764E-01  4.0498E-04  1.6344E-03  1.3059E 02  5.0429E-04
  32   .7170   45.0   546.11  1.1212E 00  2.6402E-01  3.7255E-04  1.5014E-03  1.3096E 02  4.6387E-04
  33   .7583   45.0   544.07  1.1606E 00  3.2200E-01  4.5305E-04  1.8248E-03  1.3057E 02  5.6416E-04
  34   .7996   45.0   544.87  1.4131E 00  3.4037E-01  4.7944E-04  1.9340E-03  1.3066E 02  5.9700E-04
  35   .8409   45.0   546.27  1.3671E 00  3.6445E-01  5.1434E-04  2.0755E-03  1.3098E 02  6.4041E-04
  36   .8822   45.0   546.92  1.5661E 00  4.0665E-01  5.7446E-04  2.3180E-03  1.3115E 02  7.1524E-04
  37   .9235   45.0   550.81  1.7370E 00  4.4390E-01  6.2814E-04  2.5345E-03  1.3141E 02  7.8202E-04
  38   .9648   45.0   551.40  2.0334E 00  4.8899E-01  6.9517E-04  2.8044E-03  1.3222E 02  8.6532E-04
  39   .2526   90.0   524.24  1.3997E 00  4.1376E-01  5.6795E-04  2.2943E-03  1.2626E 02  7.0793E-04
  40   .2943   90.0   527.89  1.4659E 00  4.6999E-01  6.4655E-04  2.6116E-03  1.2662E 02  8.0582E-04
  41   .3363   90.0   528.77  1.3450E 00  4.3740E-01  6.0245E-04  2.4334E-03  1.2683E 02  7.5083E-04
  42   .3783   90.0   530.73  1.2432E 00  3.9240E-01  5.4194E-04  2.1887E-03  1.2730E 02  6.7534E-04
  43   .4203   90.0   532.17  1.1769E 00  4.0702E-01  5.6333E-04  2.2749E-03  1.2766E 02  7.0194E-04
  44   .4623   90.0   532.06  9.0110E-01  3.0477E-01  4.2220E-04  1.7049E-03  1.2782E 02  5.2607E-04
  45   .5043   90.0   536.42  1.0811E 00  3.2542E-01  4.5174E-04  1.8241E-03  1.2837E 02  5.6282E-04
  46   .5463   90.0   536.27  1.1033E 00  3.3792E-01  4.7020E-04  1.8988E-03  1.2861E 02  5.8587E-04
  47   .5882   90.0   537.14  8.9062E-01  2.4983E-01  3.4812E-04  1.4055E-03  1.2882E 02  4.3366E-04
  48   .6302   90.0   538.20  1.1413E 00  3.1444E-01  4.3884E-04  1.7710E-03  1.2907E 02  5.4065E-04
  49   .6722   90.0   543.84  1.1600E 00  2.7576E-01  3.8777E-04  1.5650E-03  1.3037E 02  4.8280E-04
  50   .7170   90.0   545.39  1.1989E 00  2.8213E-01  3.9790E-04  1.6060E-03  1.3078E 02  4.9555E-04
  51   .7583   90.0   541.24  1.1313E 00  2.9469E-01  4.1300E-04  1.6670E-03  1.2986E 02  5.1437E-04
  52   .7996   90.0   541.36  1.3164E 00  3.4135E-01  4.7845E-04  1.9312E-03  1.2982E 02  5.9588E-04
  53   .8409   90.0   542.18  1.4184E 00  3.5535E-01  4.9865E-04  2.0126E-03  1.3002E 02  6.2101E-04
  54   .8822   90.0   543.34  1.6654E 00  4.0898E-01  5.7476E-04  2.3197E-03  1.3031E 02  7.1575E-04
  55   .9235   90.0   543.70  1.4642E 00  4.4831E-01  6.3045E-04  2.5444E-03  1.3034E 02  7.8508E-04
  56   .9648   90.0   547.00  2.2469E 00  5.4034E-01  7.6361E-04  3.0805E-03  1.3117E 02  9.5049E-04
  57   .2526  135.0   521.51  2.5178E-01  7.4426E-02  1.0150E-04  4.1013E-04  1.2511E 02  1.2655E-04
  58   .2943  135.0   523.17  1.4289E 00  4.9021E-01  6.7062E-04  2.7071E-03  1.2550E 02  8.3529E-04
  59   .3363  135.0   523.36  1.4632E 00  4.6182E-01  6.3138E-04  2.5510E-03  1.2554E 02  7.8712E-04
  60   .3783  135.0   522.27  1.7052E 00  3.9924E-01  5.4501E-04  2.2022E-03  1.2528E 02  6.7949E-04
  61   .4203  135.0   525.97  1.1770E 00  4.1618E-01  5.6828E-04  2.2957E-03  1.2616E 02  7.0835E-04
  62   .4623  135.0   527.56  1.2177E 00  3.5382E-01  4.8653E-04  1.9653E-03  1.2654E 02  6.0640E-04
  63   .5043  135.0   529.08  1.1074E 00  3.3600E-01  4.6032E-04  1.8592E-03  1.2690E 02  5.7360E-04
  64   .5463  135.0   530.27  1.2587E 00  3.3426E-01  4.6134E-04  1.8613E-03  1.2719E 02  5.7492E-04
  65   .5882  135.0   531.80  1.2376E 00  3.2865E-01  4.5463E-04  1.8360E-03  1.2757E 02  5.6650E-04
  66   .6302  135.0   533.16  1.2321E 00  3.2714E-01  4.5338E-04  1.8308E-03  1.2787E 02  5.6491E-04
  67   .6722  135.0   539.34  1.2494E 00  3.0646E-01  4.1996E-04  1.6953E-03  1.2934E 02  5.2309E-04
  68   .7170  135.0   540.81  1.1070E 00  2.7953E-01  3.9152E-04  1.5809E-03  1.2970E 02  4.8763E-04
  69   .7583  135.0   536.72  9.4622E-01  2.7952E-01  3.8926E-04  1.5716E-03  1.2872E 02  4.8492E-04
  70   .7996  135.0   538.52  1.2677E 00  3.6253E-01  5.0613E-04  2.0432E-03  1.2915E 02  6.3045E-04
  71   .8409  135.0   539.94  1.5222E 00  4.1941E-01  5.8672E-04  2.3684E-03  1.2949E 02  7.3077E-04
  72   .8022  135.0   540.50  1.4513E 00  4.4674E-01  6.2542E-04  2.5245E-03  1.2962E 02  7.7896E-04
  73   .9235  135.0   541.57  1.4527E 00  4.5478E-01  6.3795E-04  2.5735E-03  1.2988E 02  7.9407E-04
  74   .9648  135.0   547.60  2.4341E 00  5.8535E-01  8.2779E-04  3.3401E-03  1.3133E 02  1.0306E-03
  75   .2526  180.0   521.87  1.4145E 00  4.6912E-01  6.4605E-04  2.5862E-03  1.2519E 02  7.9799E-04
  76   .2943  180.0   525.46  9.7883E-01  3.1383E-01  4.3029E-04  1.7343E-03  1.2604E 02  5.3637E-04
  77   .3363  180.0   527.64  1.1098E 00  3.8719E-01  5.3248E-04  2.1509E-03  1.2556E 02  6.6367E-04
  78   .3783  180.0   529.61  1.1536E 00  4.0689E-01  5.6108E-04  2.2682E-03  1.2703E 02  6.9724E-04
  79   .4203  180.0   531.47  1.1651E 00  3.9762E-01  5.4966E-04  2.2198E-03  1.2746E 02  6.8494E-04
  80   .4623  180.0   533.20  1.1575E 00  3.8767E-01  5.3723E-04  2.1694E-03  1.2788E 02  6.6938E-04
  81   .5043  180.0   535.24  1.2856E 00  3.2192E-01  4.4738E-04  1.8064E-03  1.2837E 02  5.5737E-04
  82   .5463  180.0   537.31  1.2046E 00  3.1984E-01  4.4582E-04  1.7994E-03  1.2866E 02  5.5537E-04
  83   .5882  180.0   538.54  1.1029E 00  2.9247E-01  4.0890E-04  1.6507E-03  1.2916E 02  5.0932E-04
  84   .6302  180.0   539.62 -4.7149E-02 -1.7831E-02 -2.4933E-05 -1.0065E-04  1.2941E 02 -3.1055E-05
  85   .6722  180.0   546.41  1.2397E 00  2.9813E-01  4.2086E-04  1.6943E-03  1.3103E 02  5.2401E-04
  86   .7170  180.0   548.11  1.1176E 00  3.1013E-01  4.3885E-04  1.7707E-03  1.3143E 02  5.4636E-04
  87   .7583  180.0   545.71  9.6682E-01  2.3250E-01  3.2784E-04  1.3212E-03  1.3087E 02  4.0827E-04
  88   .7996  180.0   547.11  1.2693E 00  3.3064E-01  4.6721E-04  1.8852E-03  1.3119E 02  5.8170E-04
  89   .8409  180.0   548.21  1.1595E 00  3.4736E-01  4.9160E-04  1.9835E-03  1.3146E 02  6.1203E-04
  90   .8822  180.0   549.15  1.7154E 00  3.9539E-01  5.6032E-04  2.2607E-03  1.3158E 02  6.9755E-04
  91   .9235  180.0   550.28  1.9323E 00  4.7633E-01  6.7325E-04  2.7162E-03  1.3195E 02  8.3809E-04
  92   .9648  180.0   554.51  2.5320E 00  5.8348E-01  8.1120E-04  3.3607E-03  1.3296E 02  1.0370E-03
  93   .8822  225.0   552.79  1.4297E 00  4.1690E-01  5.9315E-04  2.3927E-03  1.3255E 02  7.3828E-04
  94   .9648  225.0   555.75  2.2653E 00  5.4675E-01  7.7927E-04  3.1430E-03  1.3326E 02  9.6477E-04
  95   .7170  270.0   551.90  1.2430E 00  2.8023E-01  3.9867E-04  1.6083E-03  1.3234E 02  4.9624E-04
  96   .7996  270.0   552.75  1.1700E 00  3.1009E-01  4.4255E-04  1.7852E-03  1.3254E 02  5.5082E-04
  97   .8822  270.0   555.11  1.4301E 00  3.6541E-01  5.2241E-04  2.1070E-03  1.3315E 02  6.[illegible]4E-04
  98   .9648  270.0   556.40  2.1434E 00  5.2748E-01  7.5527E-04  3.0460E-03  1.3341E 02  9.3487E-04
```


GE ASYMMETRICAL TRIM TEST
HEAT TRANSFER PHASE
GROUP 41
MACH NO = 8
1.37 X 10**6
SYM
X/L
SYM
.40
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4
32.00
24.00
16.00
8.00
0.00
-8.00

2

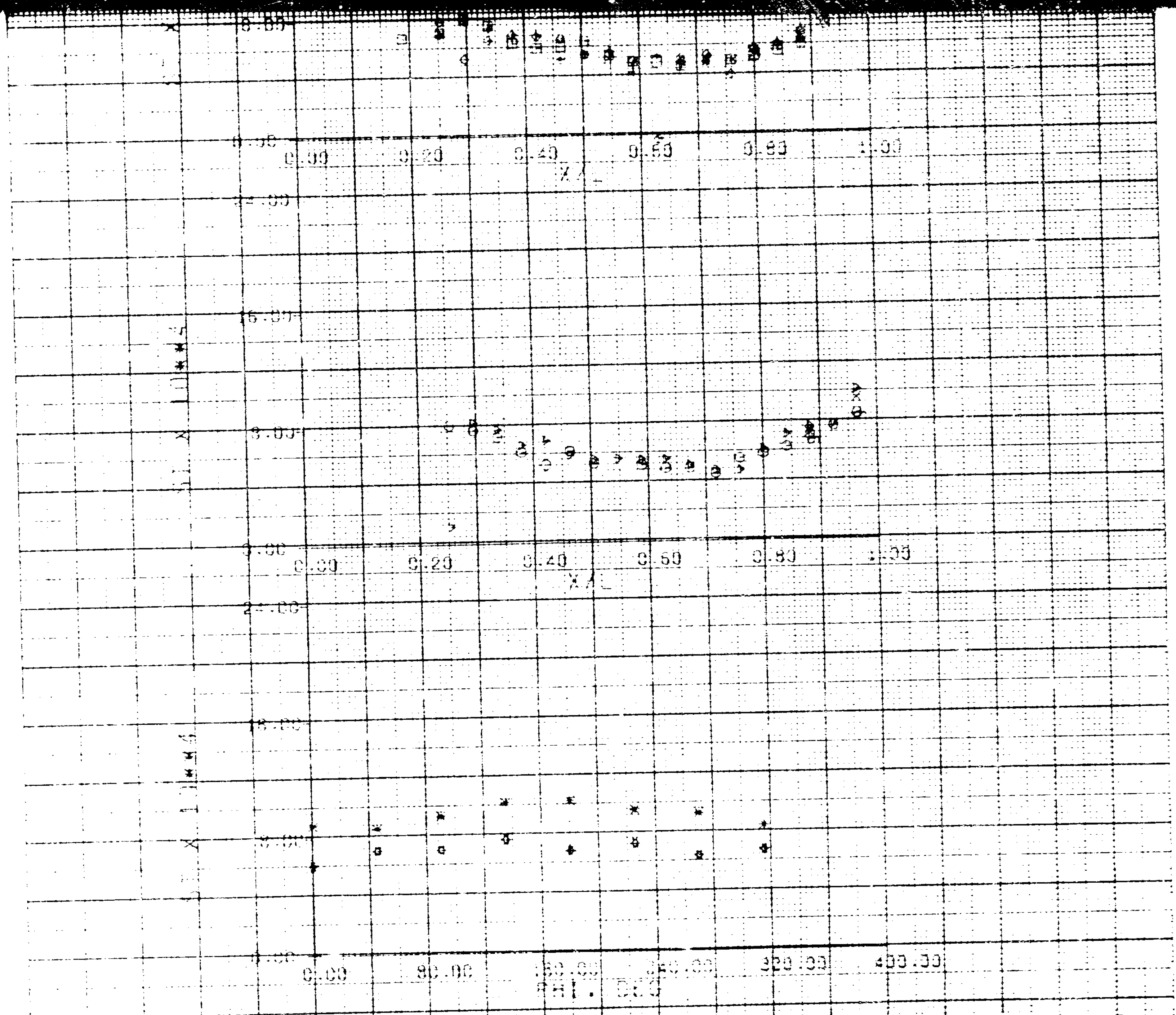

8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
X 10**4
0.00
0.00
80.00
160.00
240.00
320.00
400.00
PHI. DEG

FIGURE 57

3

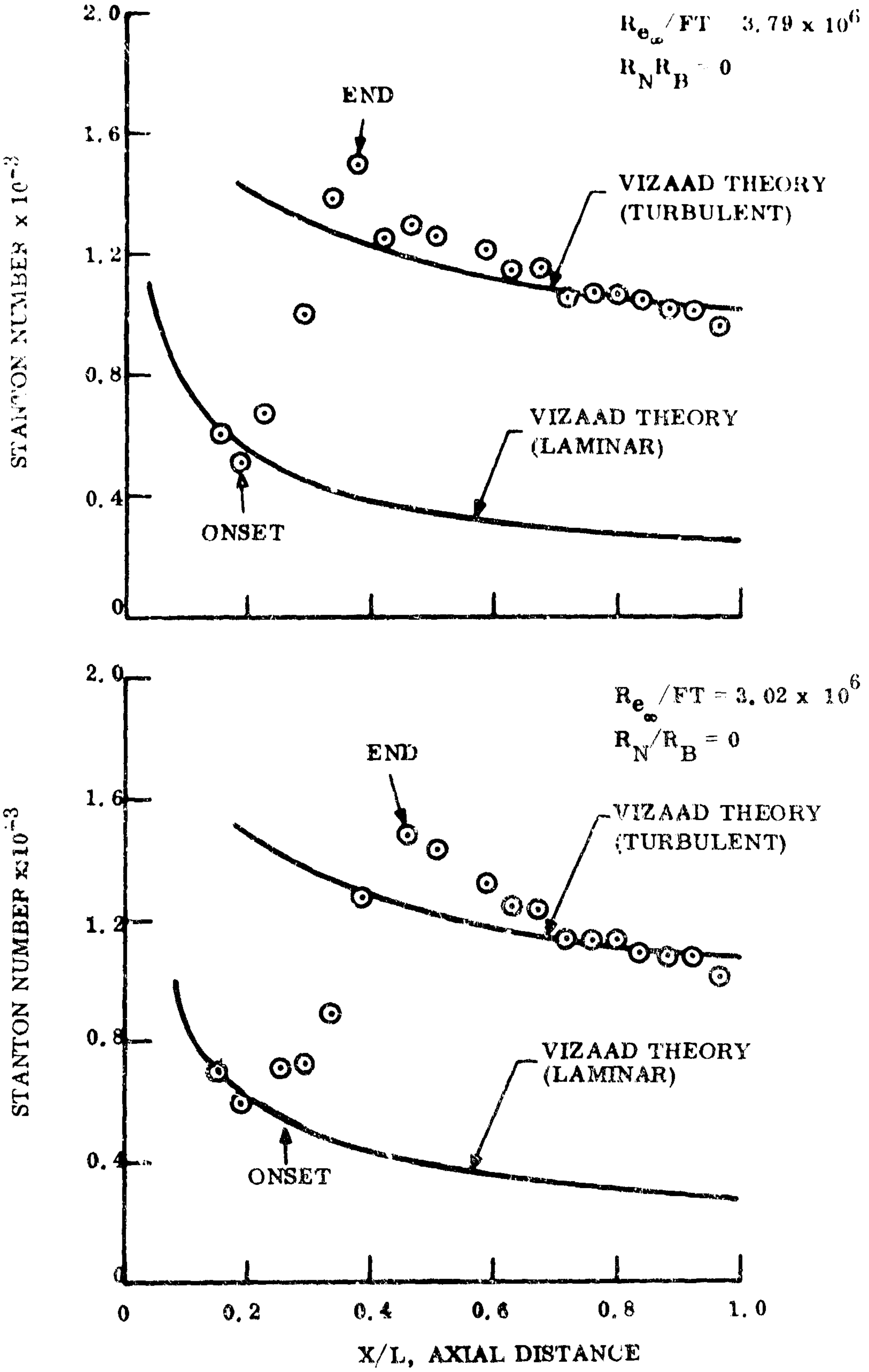


Figure 58. Stanton Number Distribution for a 7.2° Cone at Mach 8. Re_∞ = 3.79 x 10^6 per foot, R_N/R_B = 0

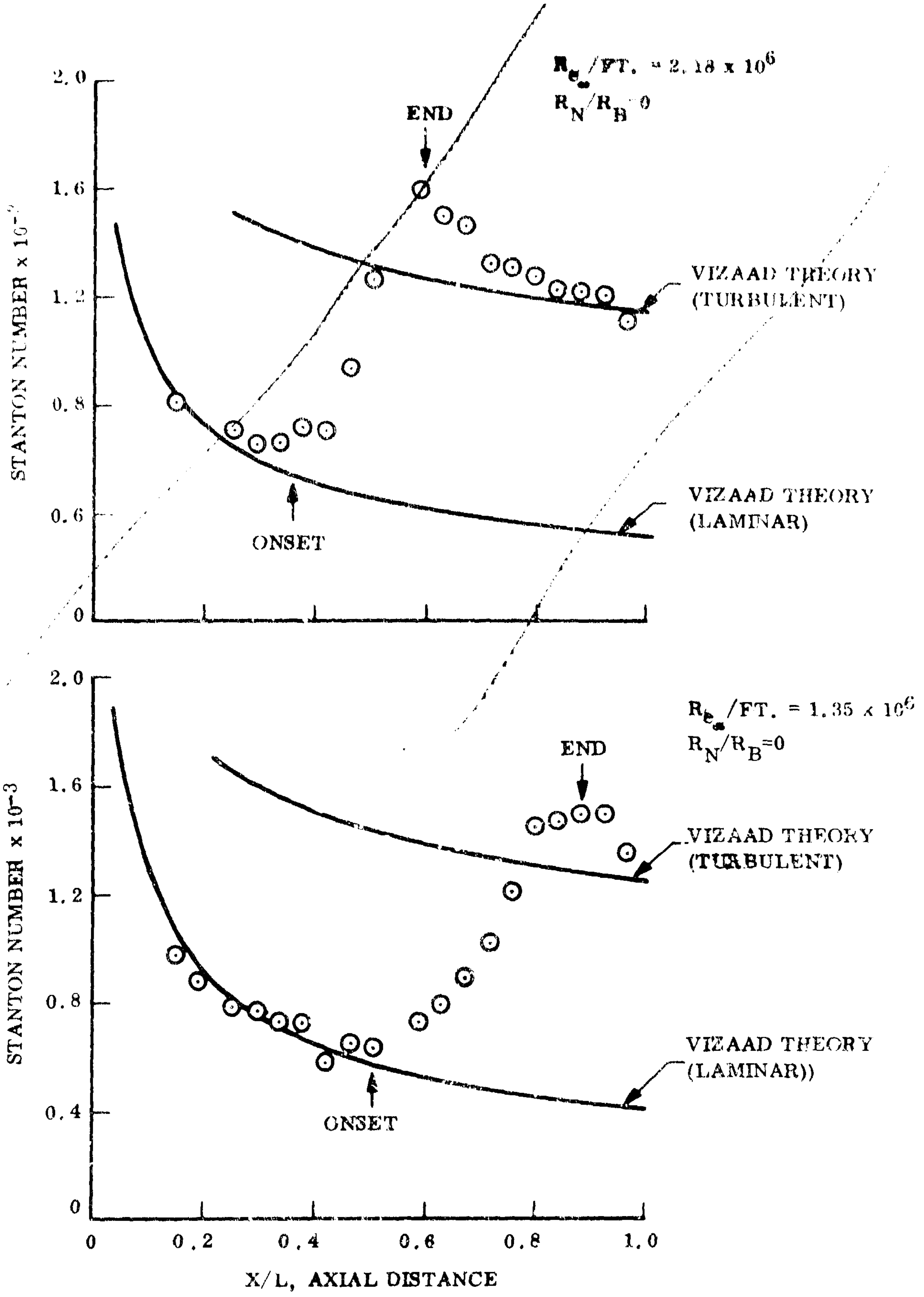


Figure 59. Stanton Number Distribution for a 7.2° Cone at Mach 8, Re_∞ 2.18 x 10^6 per foot, $R_N/R_B = 0$

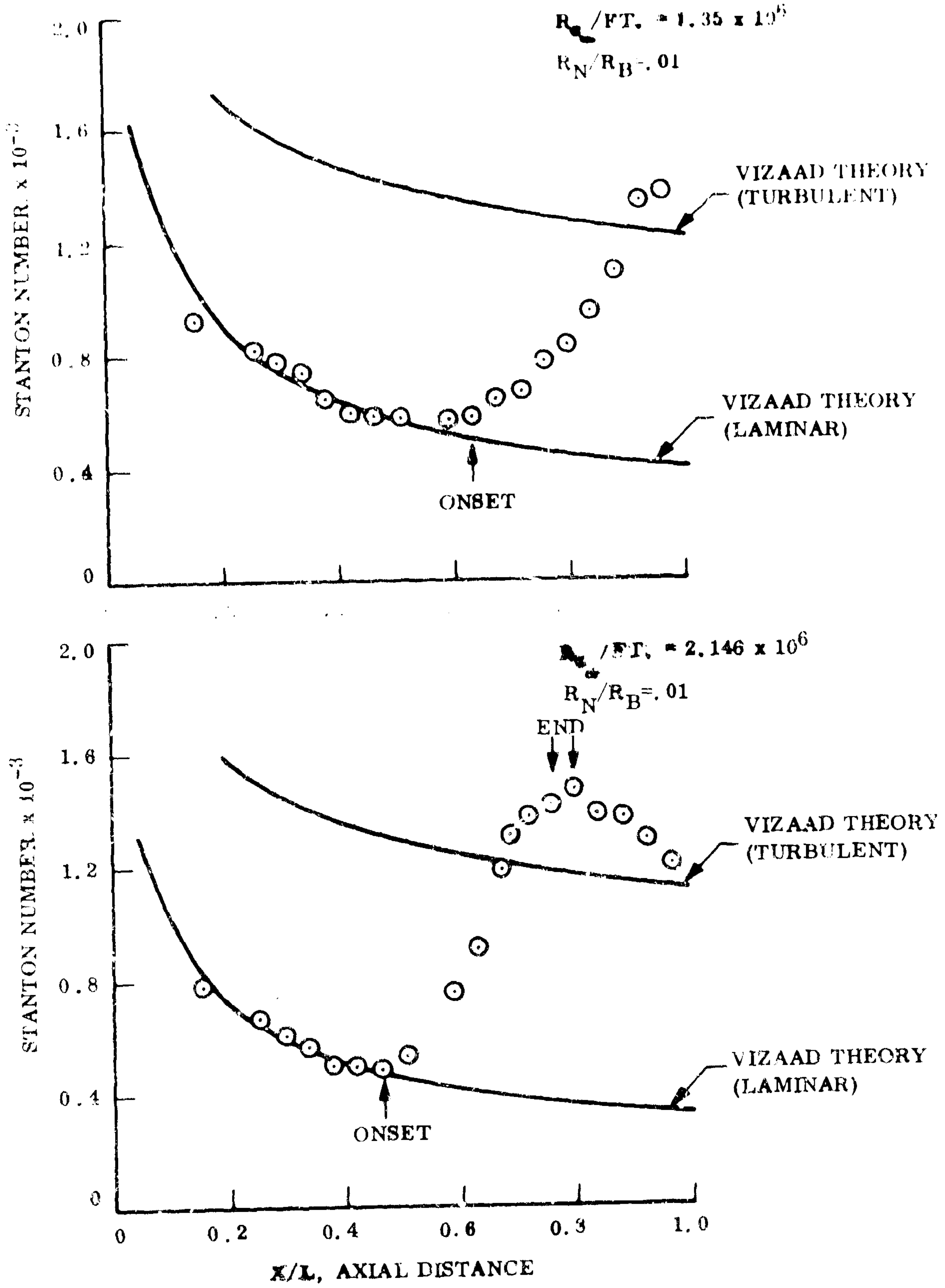


Figure 66. Stanton Number Distribution for a 7.2° Cone at Mach 8, Re_∞ 1.35 x 10^6 per foot, R_N/R_B = 0.01

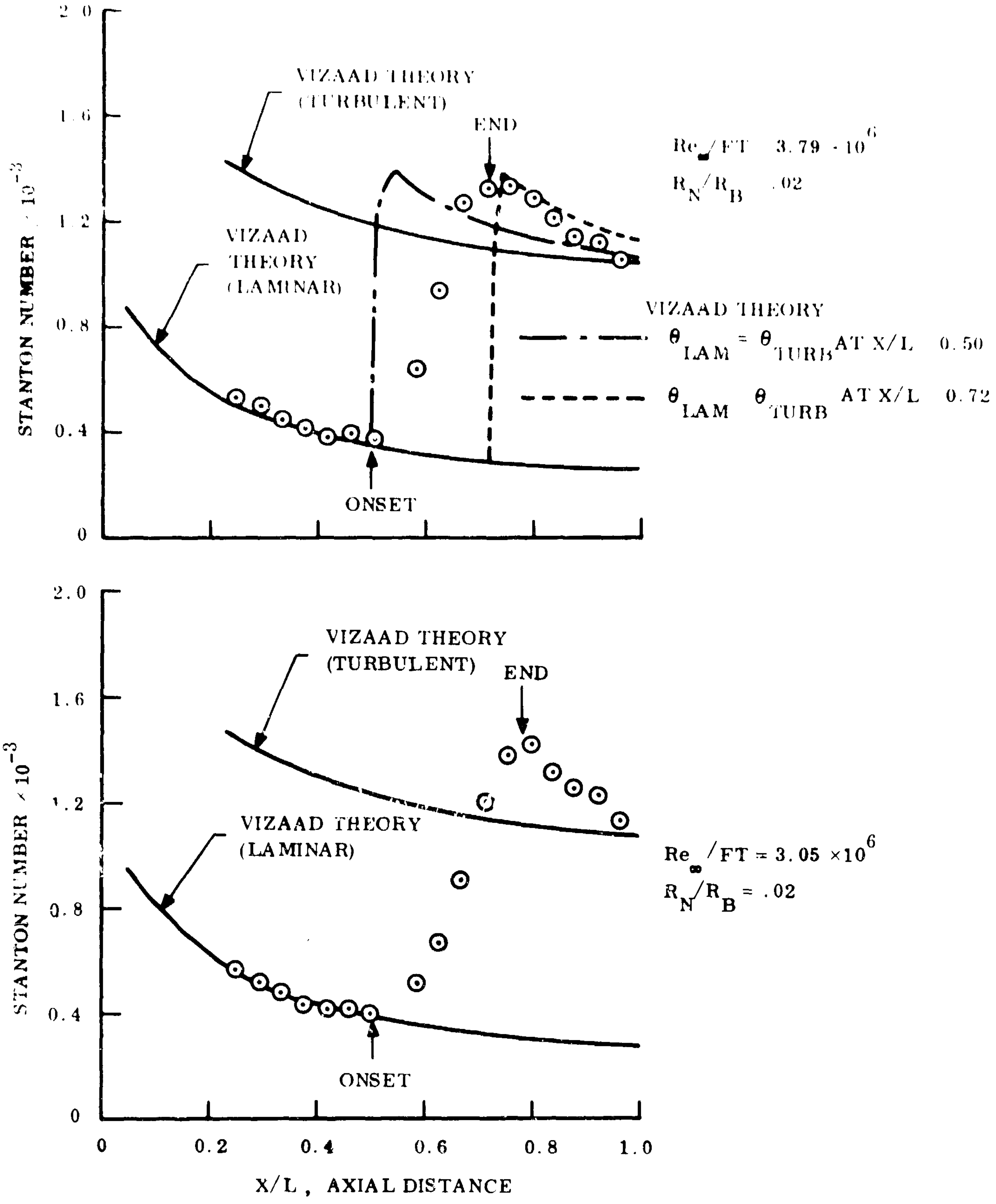


Figure 61. Stanton Number Distribution for a 7.2° Cone at Mach 8.
Re_∞ 3.79 x 10^6 per foot, R_N/R_B = 0.02

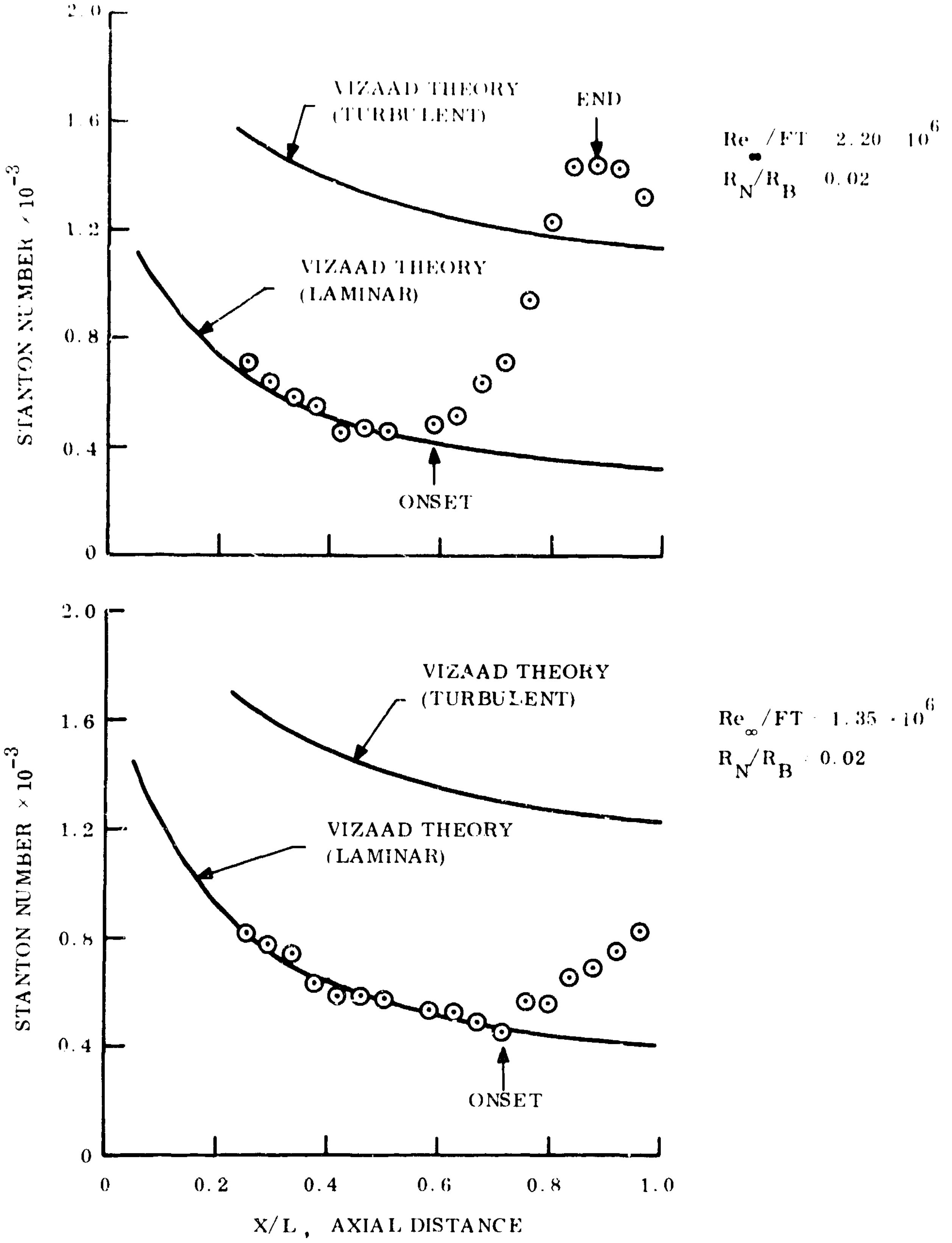


Figure 62. Stanton Number Distribution for a 7.2° Cone at Mach 8, Re_∞ 2.20 x 10^6 per foot, R_N/R_B = 0.02

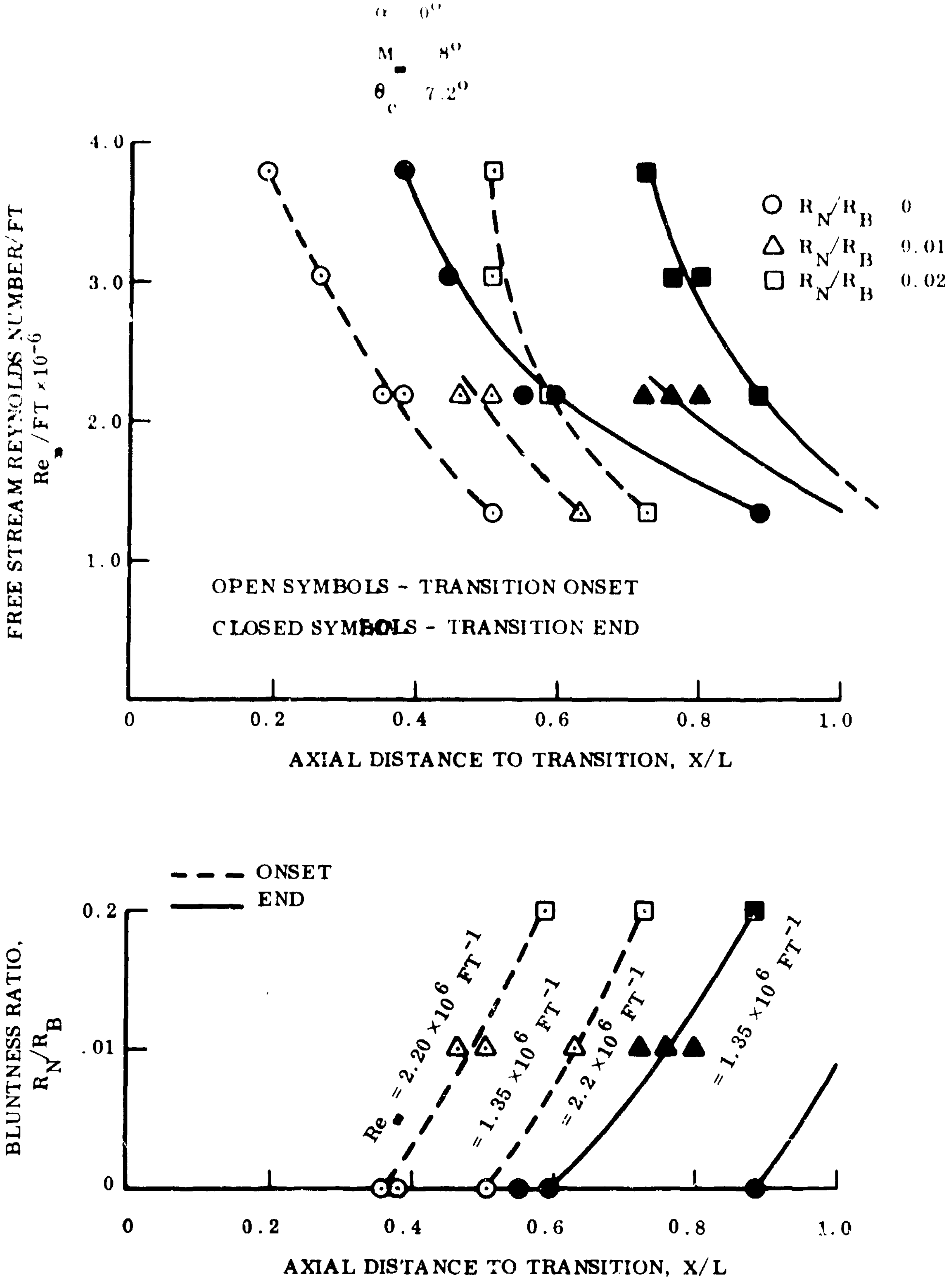


Figure 63. Effect of Reynolds Number and Bluntness on the Transition Region

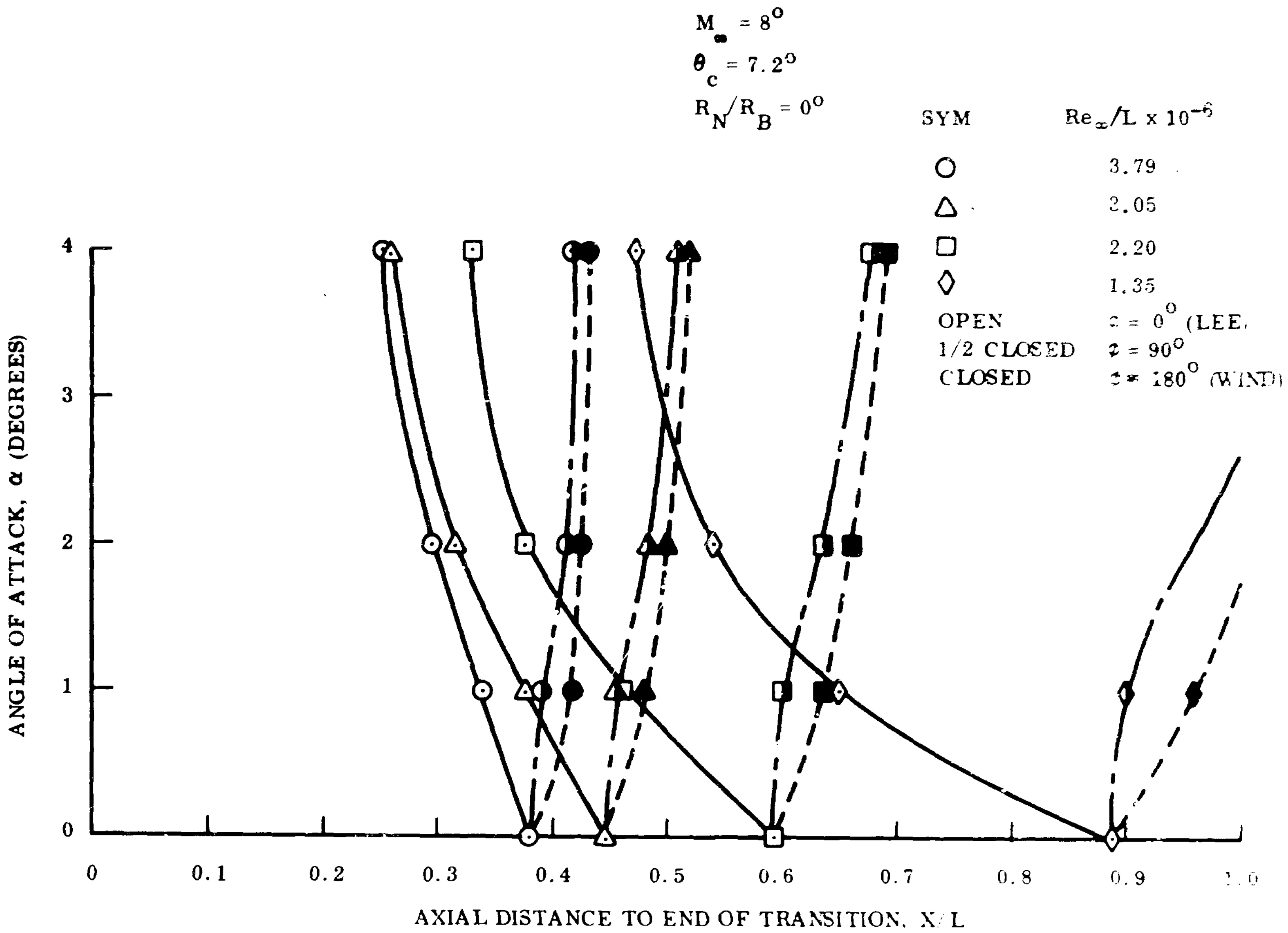


Figure 64. End of Transition Location on a Cone at Angle of Attack, $M_\infty = 8$, $\theta_c = 7.2^o$, $R_N/R_B = 0$

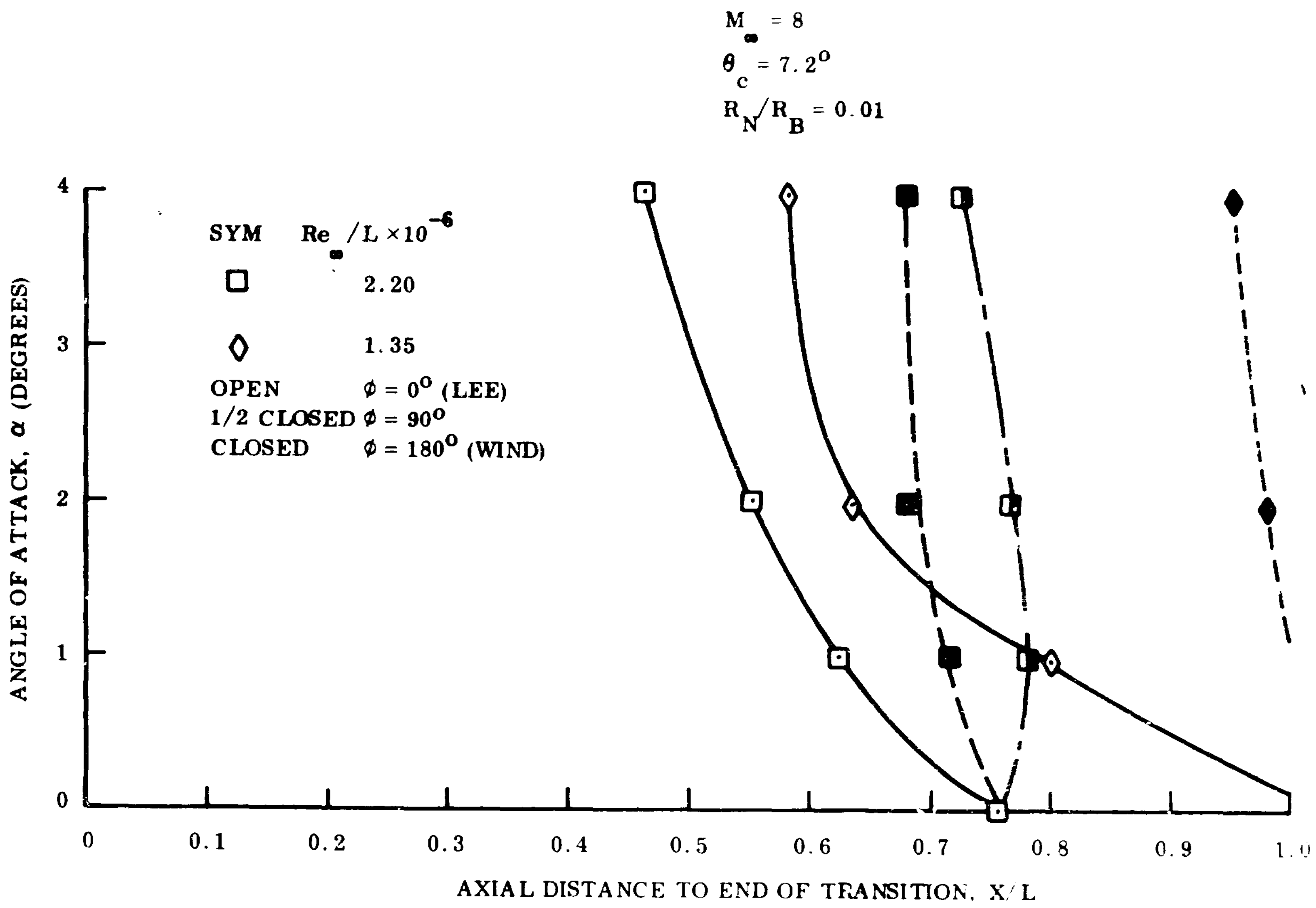


Figure 65. End of Transition Location on a Cone at Angle of Attack, $M_\infty = 8$, $\theta_c = 7.2^\circ$, $R_N/R_B = 0.01$

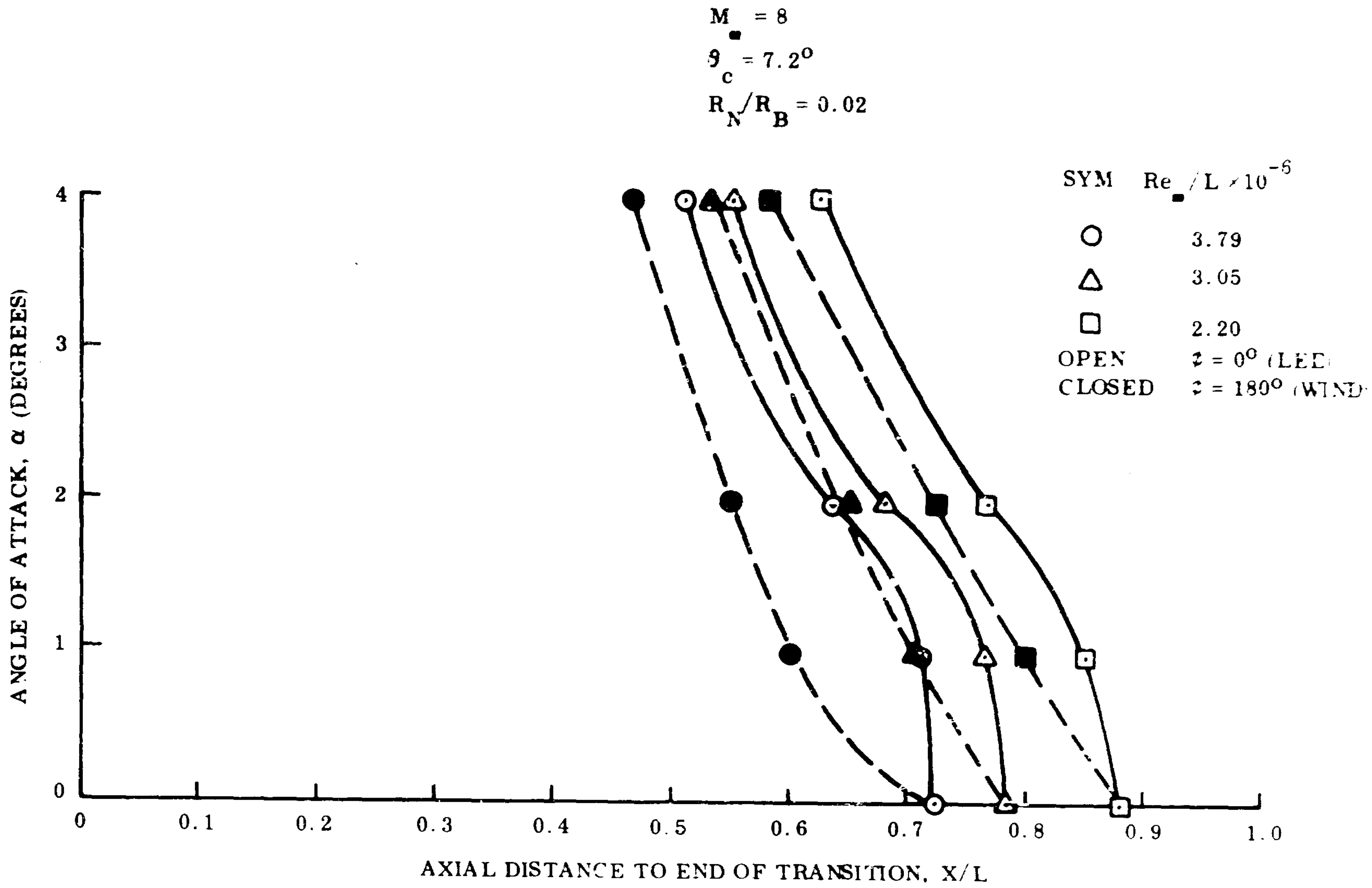


Figure 66. End of Transition Location on a Cone at Angle of Attack, $M_\infty = 8$, $\theta_c = 7.2^\circ$, $R_N/R_B = 0.02$

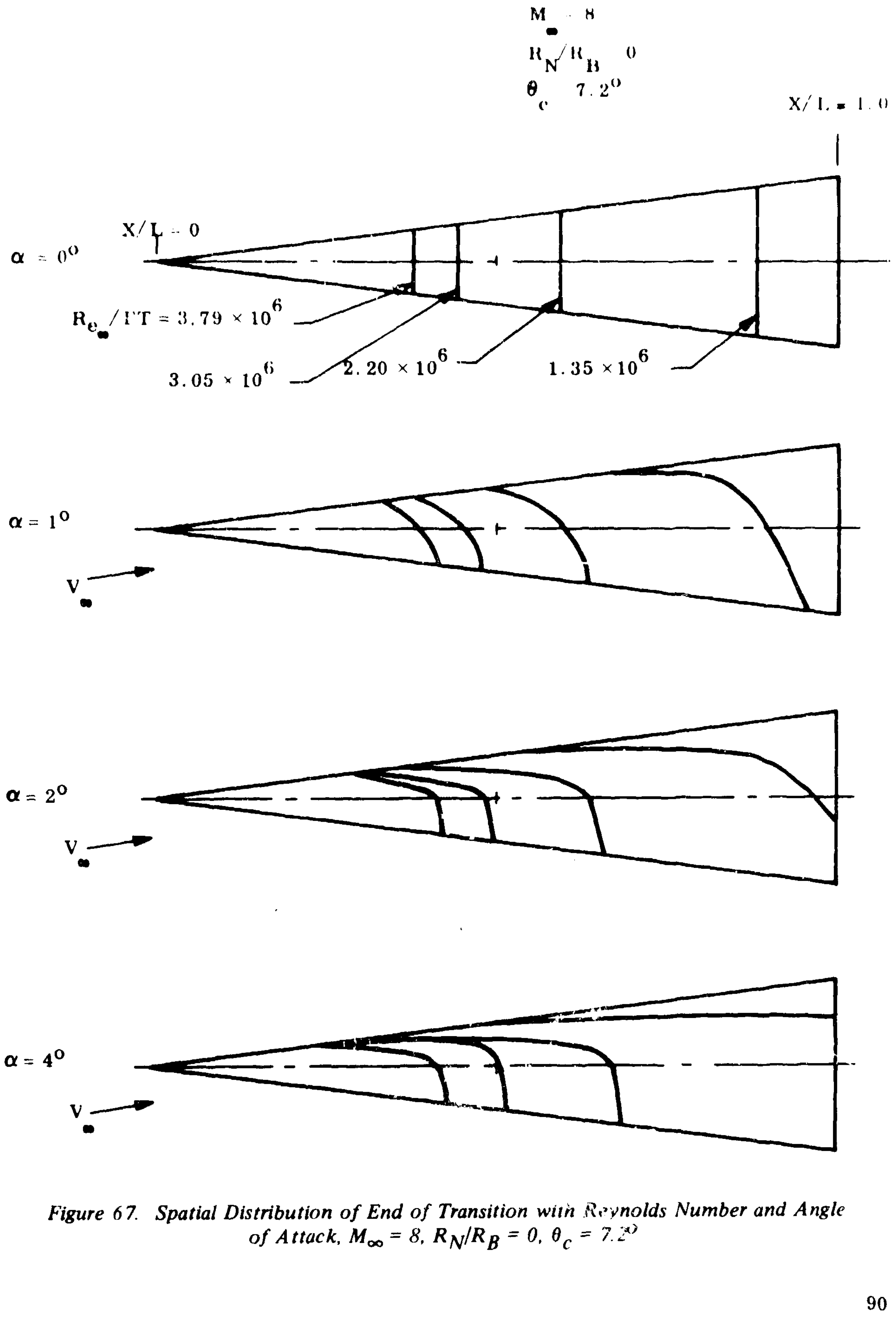


Figure 67. Spatial Distribution of End of Transition with Reynolds Number and Angle of Attack, $M_\infty = 8$, $R_N/R_B = 0$, $\theta_c = 7.2^\circ$

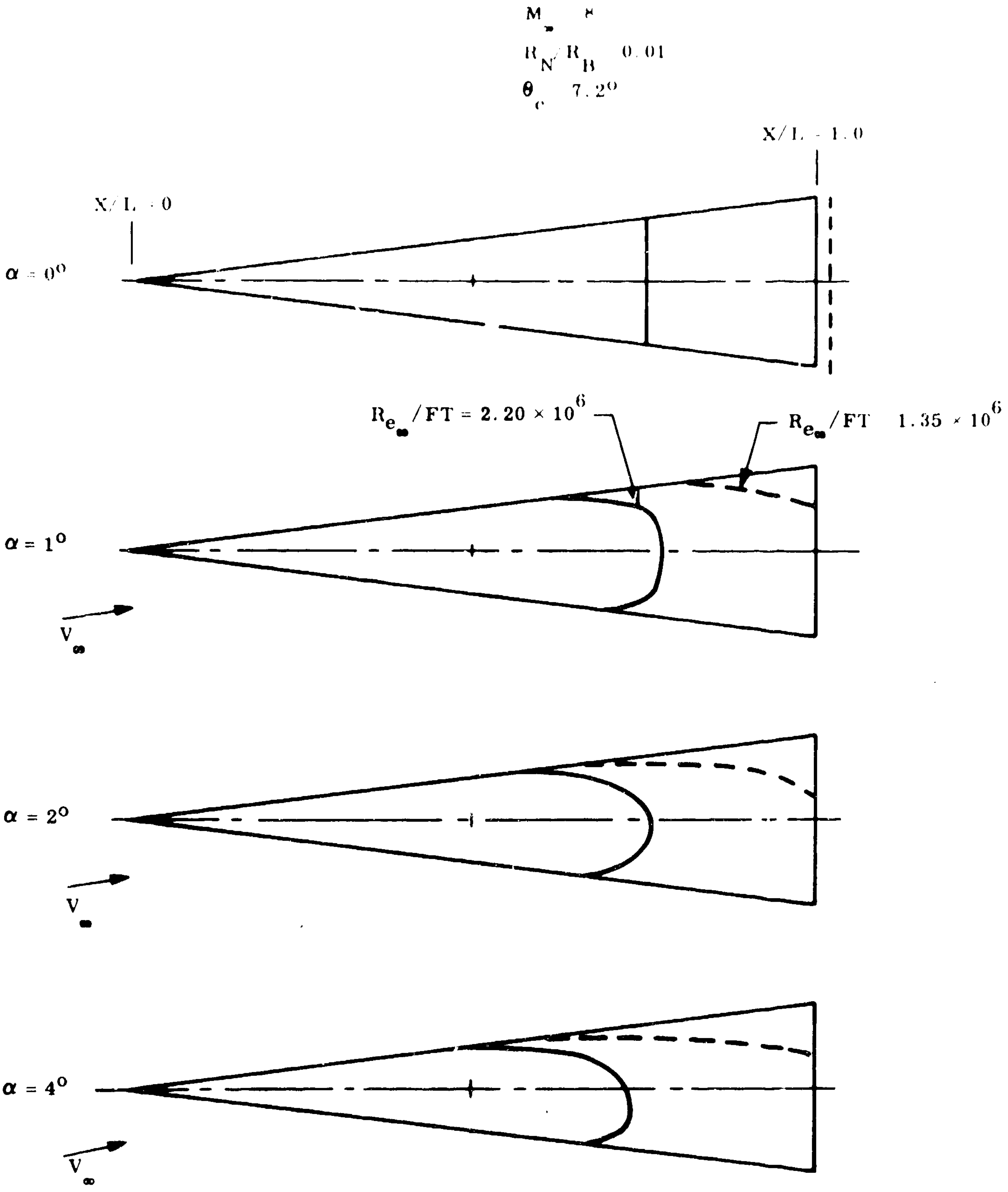


Figure 68. Spatial Distribution of End of Transition with Reynolds Number and Angle of Attack, $M_\infty = 8$, $R_N/R_B = 0.01$, $\theta_c = 7.2^\circ$

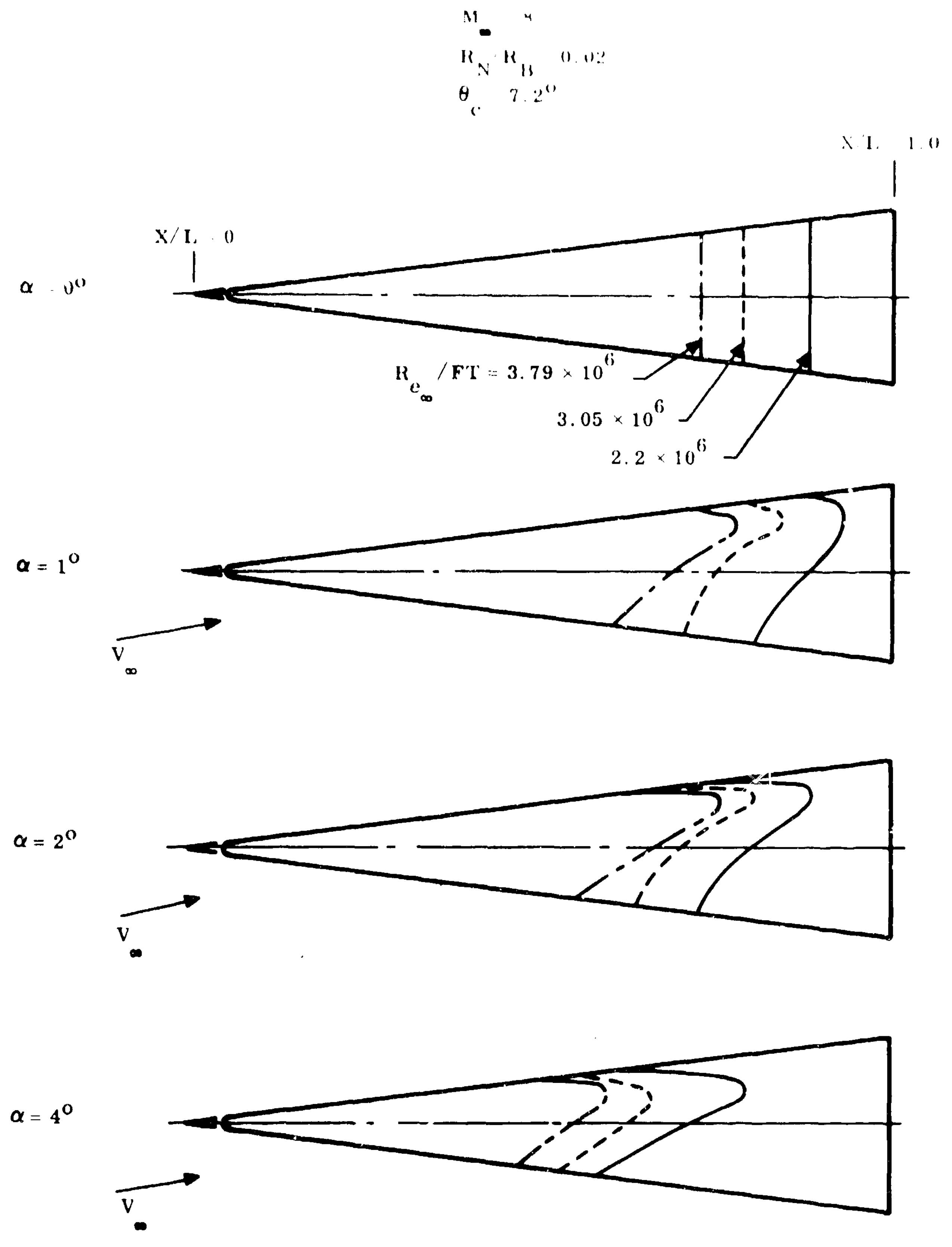


Figure 69. Spatial Distribution of End of Transition with Reynolds Number and Angle of attack, $M_\infty = 8$, $R_N/R_B = 0.02$, $\theta_c = 7.2^o$

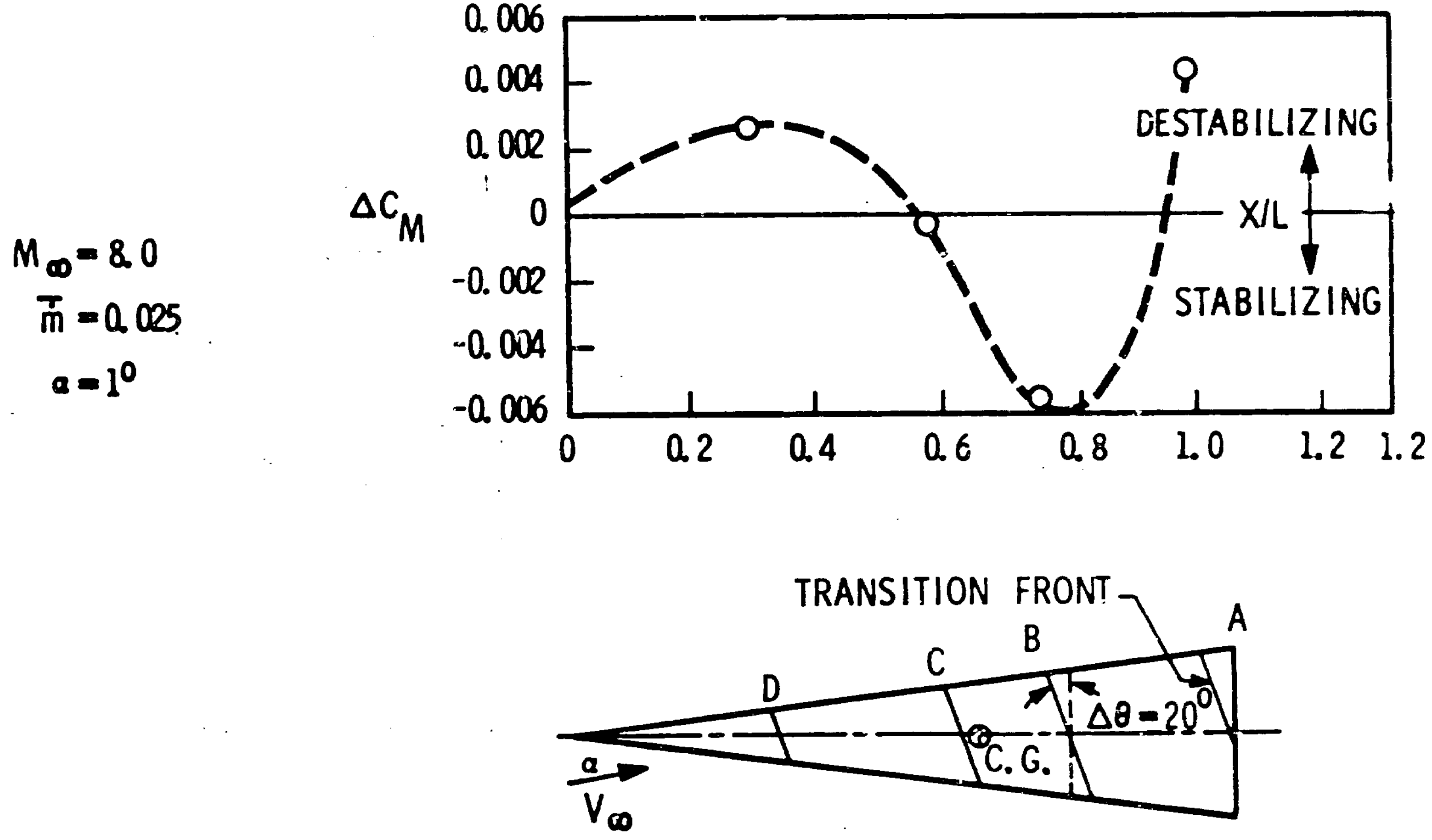


Figure 70. Effect of Asymmetric Transition on Pitching Moment Coefficient

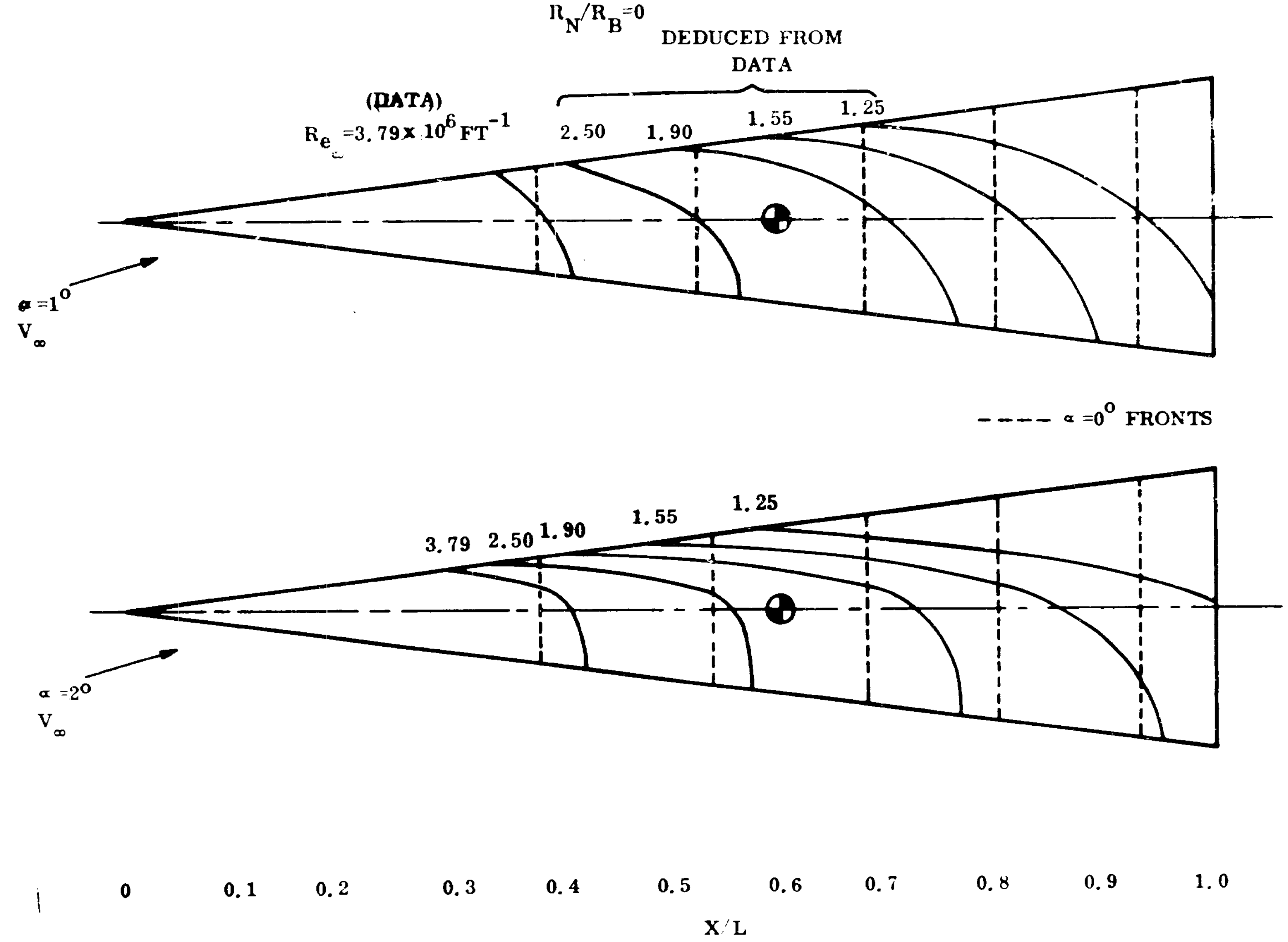


Figure 71. Proposed End of Transition Front Locations for Force Tests. $R_N/R_B = 0$

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)
General Electric Co., Re-entry & Environmental
Systems Division, 3198 Chestnut Street
Philadelphia, Penna. 19101

2a. REPORT SECURITY CLASSIFICATION
Unclassified

2b. GROUP

3. REPORT TITLE
An Experimental Investigation of Boundary Layer Transition on a Cone at Angle of Attack

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)
Technical - second half of CY 1969

5. AUTHOR(S) (Last name, first name, initial)
Martellucci, A.
Neff, R.
True, W., III

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1969	106	11

8a. CONTRACT OR GRANT NO.
F04701-69-C-0116

b. PROJECT NO.

c.

d.

9a. ORIGINATOR'S REPORT NUMBER(S)
69SD939

9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

10. AVAILABILITY/LIMITATION NOTICES
Each transmittal of this document outside the Department of Defense must have prior approval of SAMSO [redacted] (SMSDZ
L.A. AFS Calif 90045

11. SUPPLEMENTARY NOTES
The distribution of this report is limited because it contains technology requiring disclosure only within the Department of Defense.

12. SPONSORING MILITARY ACTIVITY
Space and Missile System Organization
Air Force Systems Command
Norton Air Force Base, California

13. ABSTRACT

As the first part of the Strategic Re-entry Technology (STREET G) task to determine the effect of asymmetric transition on static stability, an experimental investigation of the influence of angle of attack on boundary layer transition front location and shape has been conducted at AEDC Tunnel B at Mach 8. The model was a stainless steel 7.2° half-angle cone with three bluntness ratios ($R_N/R_B = 0, .01, .02$). For each of the bluntness ratios, heat transfer data were obtained for four (4) values of the free stream Reynolds number and for four (4) angles of attack, that is, $\alpha = 0^{\circ}, 1^{\circ}, 2^{\circ}$, and 4°. Comparisons of the heat transfer at $\alpha = 0^{\circ}$ were made with theory and good agreement resulted.

DD FORM 1 JAN 64 1473

Unclassified
Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Hypersonic Flow						
Boundary Layer Transition						
Heat Transfer						
Angle of Attack						
Bluntness						
Reynolds Number						

INSTRUCTIONS

1. **ORIGINATING ACTIVITY**: Enter the name and address of the contractor, subcontractor, grantee, Department of Defense activity or other organization (*corporate author*) issuing the report.

2a. **REPORT SECURITY CLASSIFICATION**: Enter the overall security classification of the report. Indicate whether "Restricted Data" is included. Marking is to be in accordance with appropriate security regulations.

2b. **GROUP**: Automatic downgrading is specified in DoD Directive 5200.10 and Armed Forces Industrial Manual. Enter the group number. Also, when applicable, show that optional markings have been used for Group 3 and Group 4 as authorized.

3. **REPORT TITLE**: Enter the complete report title in all capital letters. Titles in all cases should be unclassified. If a meaningful title cannot be selected without classification, show title classification in all capitals in parenthesis immediately following the title.

4. **DESCRIPTIVE NOTES**: If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusive dates when a specific reporting period is covered.

5. **AUTHOR(S)**: Enter the name(s) of author(s) as shown or or in the report. Enter last name, first name, middle initial. If military, show rank and branch of service. The name of the principal author is an absolute minimum requirement.

6. **REPORT DATE**: Enter the date of the report as day, month, year, or month, year. If more than one date appears on the report, use date of publication.

7a. **TOTAL NUMBER OF PAGES**: The total page count should follow normal pagination procedures, i.e., enter the number of pages containing information.

7b. **NUMBER OF REFERENCES**: Enter the total number of references cited in the report.

8a. **CONTRACT OR GRANT NUMBER**: If appropriate, enter the applicable number of the contract or grant under which the report was written.

8b, 8c, & 8d. **PROJECT NUMBER**: Enter the appropriate military department identification, such as project number, subproject number, system numbers, task number, etc.

9a. **ORIGINATOR'S REPORT NUMBER(S)**: Enter the official report number by which the document will be identified and controlled by the originating activity. This number must be unique to this report.

9b. **OTHER REPORT NUMBER(S)**: If the report has been assigned any other report numbers (*either by the originator or by the sponsor*), also enter this number(s).

10. **AVAILABILITY/LIMITATION NOTICES**: Enter any limitations on further dissemination of the report, other than those imposed by security classification, using standard statements such as:

(1) "Qualified requesters may obtain copies of this report from DDC."

(2) "Foreign announcement and dissemination of this report by DDC is not authorized."

(3) "U. S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users shall request through
______________________________."

(4) "U. S. military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through
______________________________."

(5) "All distribution of this report is controlled. Qualified DDC users shall request through
______________________________."

If the report has been furnished to the Office of Technical Services, Department of Commerce, for sale to the public, indicate this fact and enter the price, if known.

11. **SUPPLEMENTARY NOTES**: Use for additional explanatory notes.

12. **SPONSORING MILITARY ACTIVITY**: Enter the name of the departmental project office or laboratory sponsoring (*paying for*) the research and development. Include address.

13. **ABSTRACT**: Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as *(TS), (S), (C), or (U)*.

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. **KEY WORDS**: Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location, may be used as key words but will be followed by an indication of technical context. The assignment of links, rules, and weights is optional.